Approaching Cone Collection through Partnerships and Innovation

on the Fremont-Winema National Forest

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NANCY FLOYD

COVER: TRAVIS ERICKSON / COLLINS PINE

Bryan Reatini,
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Background

This document attempts to capture the process and methods employed for the 2024 cone collection project on the **Fremont-Winema National Forest (Fre-Win)**. Although this project was quite successful, there were many lessons learned along the way that have been documented in this report for the benefit of others. Many on the Fre-Win had not previously experienced a cone collection of this scale, so on-the-job training was utilized extensively and is detailed in this report.

It should be noted that many contributed to the success of this project, including the Fre-Win Forest Leadership Team who designated this project as a forest priority, Fre-Win employees who enthusiastically served as boots on the ground during implementation, and off-forest personnel who filled key positions and served with force account climbing teams. Regional and Washington Offices provided invaluable support for training, logistics and funding requests. Cone collection contractors responded to challenges and needs quickly, always giving their best effort. Partners, with a shared interest in forest restoration, exemplified flexibility and a “can do” spirit, providing a vehicle to accomplish tasks quickly.

ANDREW STUDER / AMERICAN FORESTS

Ponderosa pine cone

Sections

1 Introduction

2 Climate matching seed sources to planting sites

Describes the need for climate-smart seed and why collecting in areas that have not historically been considered is important.

3 Partnerships and agreements

Provides a step-by-step process for how to successfully work with partners and establish agreements.

4 Private land collection

Summarizes the process used in partnering with Oregon Department of Forestry (ODF) through the Good Neighbor Authority and setting the stage to collect on privately owned lands.

5 Cone surveys

Describes the process used to survey for cones across ownership boundaries.

6 Training

Highlights the utilized training for Fre-Win staff and partners to provide basic knowledge of cone surveys and collection.

7 Safety, organization and logistics

Describes the thought process in organizing a large project with safety being a key objective.

8 Cone collection

Describes the overall cone collection process utilizing all tools and partners as well as summarizes the cost, bushel collection, examples of how each partner contributed, and final data on seed quality.

9 Cone storage and transport

Describes the planning and process for storing cones during the collection and transport to extractories.

10 Conclusion

Many forests are facing a similar situation as the Fre-Win. The authors hope this report is useful in informing and guiding future large-scale collection efforts. If there are any questions, please contact the authors of this report. Good Luck!

Bushel of ponderosa pine cones

Large-scale fires are increasing in frequency and intensity across the Pacific Northwest Region of the USDA Forest Service (Region 6), resulting in a reforestation backlog of approximately 1 million acres (PNW Regional Reforestation Implementation Plan, 2024). The Fre-Win carries almost 50% of the region's total reforestation backlog — most of which stems from large-scale fires occurring during the last five years (**Figure 1**).

In partnership with American Forests, the Fre-Win has identified approximately 260,000 acres that will need to be planted, with the remainder of the backlog being designated as natural regeneration or natural recovery (Pansing et al. 2023). In order to meet that planting target, the Fre-Win is estimated to need approximately 11,000 pounds of seed, the vast majority of which is ponderosa pine (*Pinus ponderosa*). However, prior to the 2024 collection, the Fre-Win's seed inventory could only support around 15% of that seed need. Other land managers in Klamath and Lake Counties, such as the Bureau of Land Management, ODF and private industry, including Collins Pine and Green Diamond, also faced similar seed shortages due to recent large-scale fires.

Thus, land managers throughout south central Oregon were collectively facing widespread seed shortages, necessitating innovative approaches to seed collection and deployment across all ownerships.

Additionally, south central Oregon has become much more arid during the last 30 years, including the entirety of the Fre-Win (**Figure 2**), which has created an additional challenge for land

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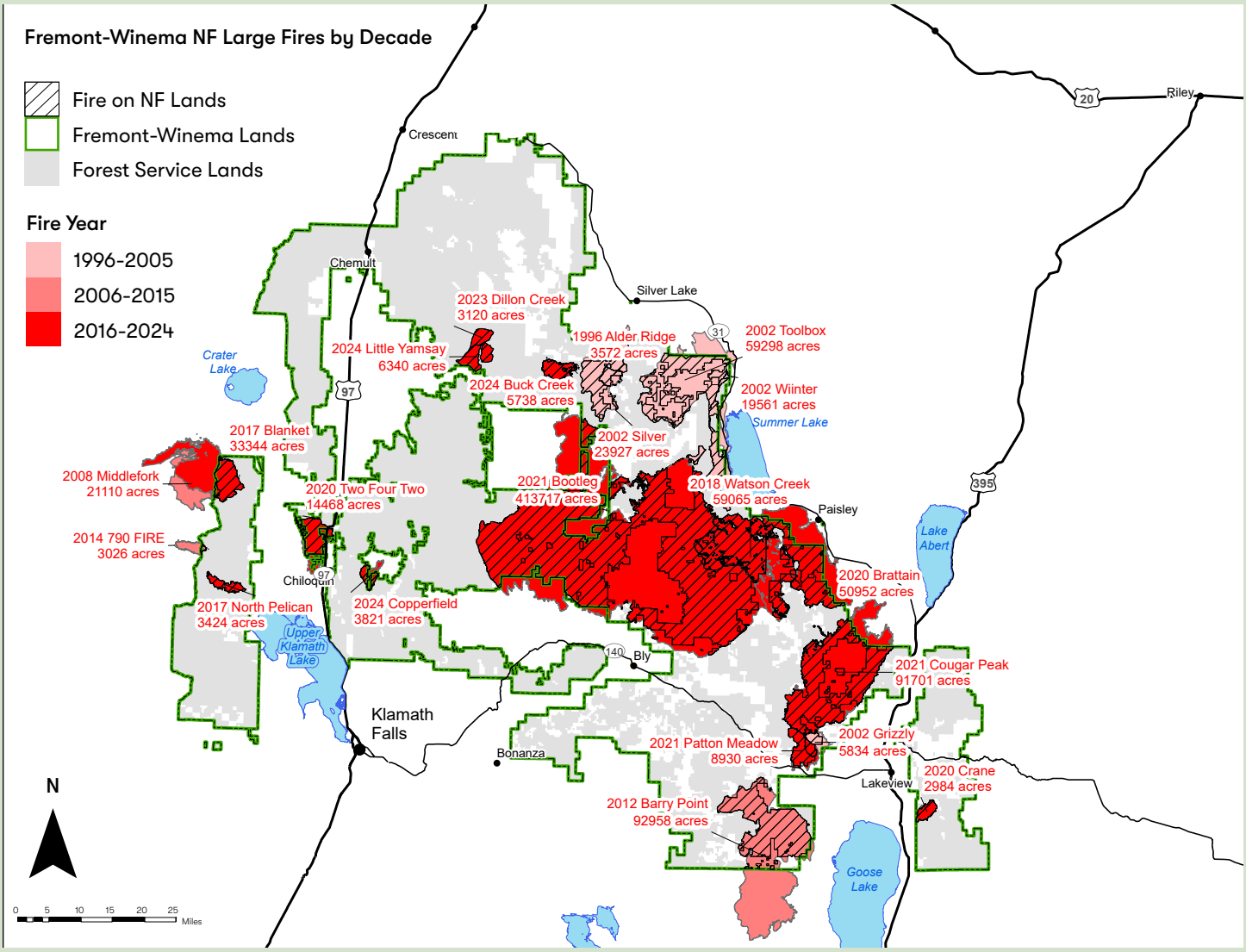

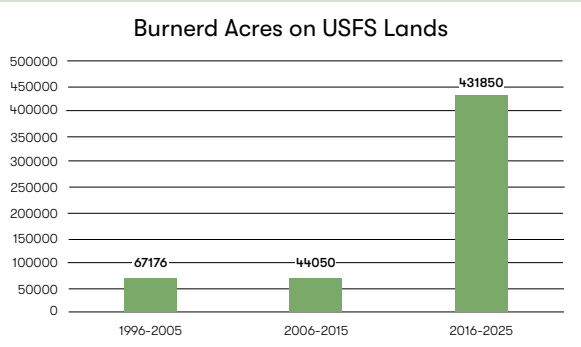

Figure 1

Large fires by decade on the Fre-Win. Major fires referenced throughout the text are displayed on the map and are colored by fire year. Burned acres on USDA Forest Service lands over time are shown to the left.

managers. Not only does an increase in aridity threaten to exacerbate large-scale fires, which are the primary driver of seed shortages, but it also threatens to stress local tree populations that are facing more drought-prone conditions than they experienced historically. Drought stress has been observed as contributing to stand-level die-off events in several tree species in the western U.S., such as ponderosa pine and white-fir die-offs in the Sierra Nevada (Robbins et al., 2023), Douglas-fir in the Klamath ecoregion (Bennett et al., 2023), and western redcedar in western Washington (Andrus et al., 2024). In the case of ponderosa pine, drought stress can lead to upticks in pine beetle activity (Robbins et al., 2023). There have been several large pine beetle outbreaks recorded on the Fre-Win in recent years, suggesting that local tree populations may already be experiencing some degree of drought stress. This trend suggests that more drought-tolerant seed sources, such as those at lower elevations or more southerly latitudes, may become increasingly important areas to consider for seed collection in the coming decades. However, lower elevations are often not administered by the USDA Forest Service.

Thus, as climate continues to change in the coming decades, it will become important to establish new ways to collect seed across land ownerships to maintain well-adapted forests throughout Klamath and Lake Counties.

This need for collaborative cone collection efforts to mitigate the effects of climate change, along with the dramatic seed shortage across land ownerships, was the impetus for developing a suite of scientific analyses, agreements and cone collection plans among land holders in Klamath and Lake Counties. The primary objective of this effort was to guide collaborative cone collection efforts across land ownerships in the coming years. The analyses and agreements that went into this effort laid the foundation for a historic cone collection effort during 2024, which yielded roughly 2,600 bushels of cones (and an approximately equal amount of seed) for deployment on the Fre-Win, and a total of ~6,300 bushels of cones across all land ownerships in Klamath and Lake Counties. This yield represents roughly 30% of the Fre-Win's seed shortage (approximately 2,600 pounds of seed). This effort was only made possible by leveraging the best available science for seed sourcing, establishing numerous partnerships and coordinating collective efforts by a wide range of participants including partners, contractors, on-forest officials and regional specialists.

This report documents the process to 1) evaluate the need for collaborative cone collection efforts in the first place, including assessments of the impacts of climate change, seed shortages for the Fre-Win, and climate matching for suitable seed sourcing across Klamath and Lake Counties; 2) establish the collaborative agreements with partners; and 3) carry out the large-scale, multi-partner cone collection effort that took place in 2024. The objective of this document is to outline steps that were taken throughout this process and lessons learned.

This document is intended to serve as a reference for other national forests to consider when developing their own plans for cone collection and seed deployment.

Ponderosa pine tree on the
Fremont-Winema National Forest

2

Climate matching seed sources to planting sites

FOREST TREE POPULATIONS are tightly adapted to their local climate conditions. For this reason, seed zones have been established in the Pacific Northwest to guide seed collection and deployment and maintain local adaptations. Seed zones are local geographic units that encompass similar environmental conditions. They are then sub-divided into elevation bands of 500–1,000 feet. On national forest lands in the Pacific Northwest, there is an analogous system which uses breeding blocks (similar to seed zones), and the elevation bands within breeding blocks are called breeding zones. The reason for this approach is that climate varies across geographic space and with elevation. Thus, by limiting seed transfer within a similar elevation, as well as within a similar geographic area, we can help ensure that we plant seedlings that are well adapted to the climate conditions of the planting site.

The issue with this approach is that climate conditions are rapidly shifting in the Pacific Northwest, including increasing temperatures and more pronounced summer drought conditions (**Figure 2**). Due to their long generation times and limited dispersal capacities, many forest tree species have limited capacity to respond to rapid environmental change quickly enough to maintain local adaptation (Aitken & Whitlock, 2013). Consequently, climate change can result in tree populations becoming increasingly maladapted to their local environment under rapidly changing conditions. This means that the present-day climate conditions occurring within seed/breeding zones may no longer be representative of the historic conditions they were designed to capture.

It is therefore important to understand the impact that the rate of climate change has on our forests at the local level to evaluate the potential for maladaptation within seed/breeding zones and adjust guidelines for seed collection and deployment accordingly.

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To assess the extent to which climate change has impacted the Fre-Win to date, the degree of change observed across the landscape was quantified from historic climate normals (1960–1990) to present-day climate normals (1990–2020) for two climate variables known to be important for local adaptation in a variety of forest tree species. These two variables were Mean Temperature of the Coldest Month (MCMT), a variable tied to cold hardiness, and Summer Heat: Moisture Index (SHM), a variable used to quantify the intensity of summer drought conditions (i.e. the default variables for the Seedlot Selection Tool; St.Clair et al., 2022).

To provide a point of comparison, change in the two climate variables was also quantified for all other forests in Region 6.

This analysis revealed that south central Oregon has become much more arid in the last 30 years (**Figure 2B**), and that aridity has changed more rapidly on the Fre-Win than any other forest in Region 6.

These results suggest that local tree populations on the Fre-Win are likely starting to become out of sync with the climate conditions to which they are adapted, posing a threat of maladaptation. Indeed, much of the region including the Fre-Win has already changed by 1–1.5 degrees Celsius (1.8–2.7 degrees Fahrenheit) MCMT (**Figure 2A**), which is nearing a threshold of 2 degrees Celsius (3.6 degrees Fahrenheit) beyond which growth and survival have been observed to start decreasing due to maladaptation in some forest tree species (St. Clair, et al. 2020).

Given the potential for maladaptation revealed from the above results, the degree of climate mismatch for each individual breeding zone on the Fre-Win was assessed. To do so, the range of variation that occurred in each zone was characterized for MCMT and SHM for the historic climate normal period (1960–1990). That range was then used to define a so-called climate-transfer limit for each zone. This transfer limit was defined as half the range of variation in the zone centered on the median climate condition of the zone. The fidelity of these transfer limits was then tested by quantifying the percentage of the zone that fell within the transfer limit under historic climate conditions.

As expected, on average 92.4% of the zone fell within the transfer limit, demonstrating the ability of the transfer limit to accurately capture the range of climate variation represented within the zone under historic conditions. Critically, this means that the transfer limits defined here offer a good estimation for the range of climate conditions to which populations within the zone are adapted, at least for the two variables used here.

Once transfer limits were established, the percentage of the acreage of each zone that remained within the zone's transfer limit under present-day climate conditions was assessed (e.g. after empirical change in climate had been considered; **Figure 3A**). These results were then summarized by binning the zones into categories representing degrees of climate mismatch (**Figure 3B**). If 75% or greater of the zone remained within the transfer limit under present-day climate conditions, the zone was considered stable. If 50–75% of the zone was within the transfer limit, the zone was considered slightly mismatched, whereas if 25–50% of the zone was within the transfer limit, the zone was considered moderately mismatched.

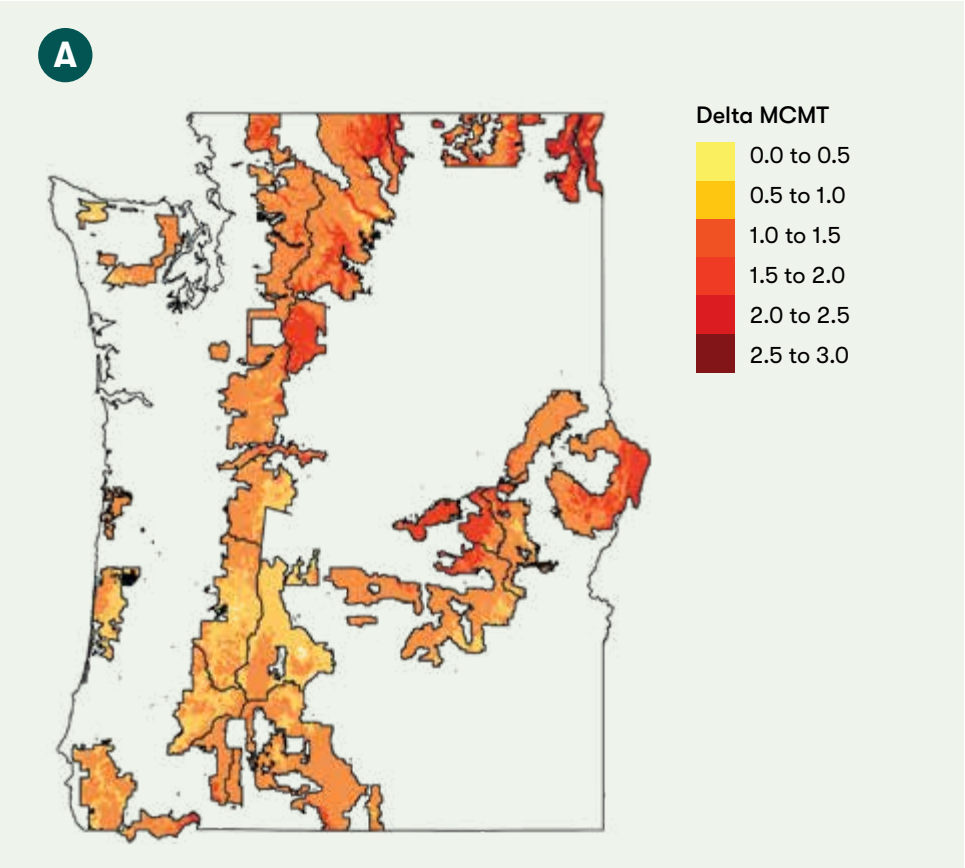

Figure 2

Change in Mean Temperature of the Coldest Month (**Panel A**) and relative change in Summer Heat: Moisture Index (**Panel B**) from historic climate normals (1960–1990) to present-day climate normals (1990–2020) across all national forests in Region 6. The data represented in Figure 2 is in degrees Celsius. A change of 1 degree Celsius is equivalent to a change of 1.8 degrees Fahrenheit.

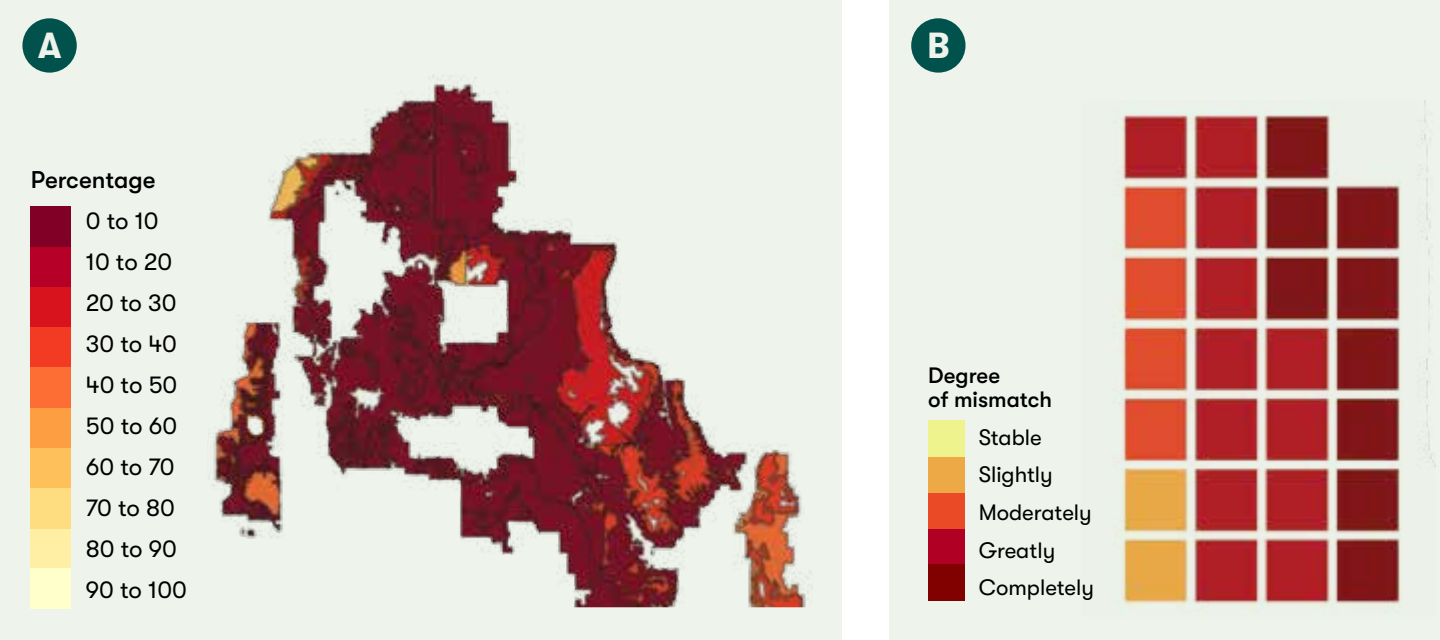

Figure 3

A) Map of the 27 generic breeding zones on the Fre-Win, colored by the percentage of the zone under present-day climate conditions that remains within the historic transfer limit. **B)** Waffle chart displaying each of the 27 breeding zones as a square, colored by the degree of climate mismatch. Darker colors represent zones that have more extreme climate mismatch and are therefore at higher risk for maladaptation.

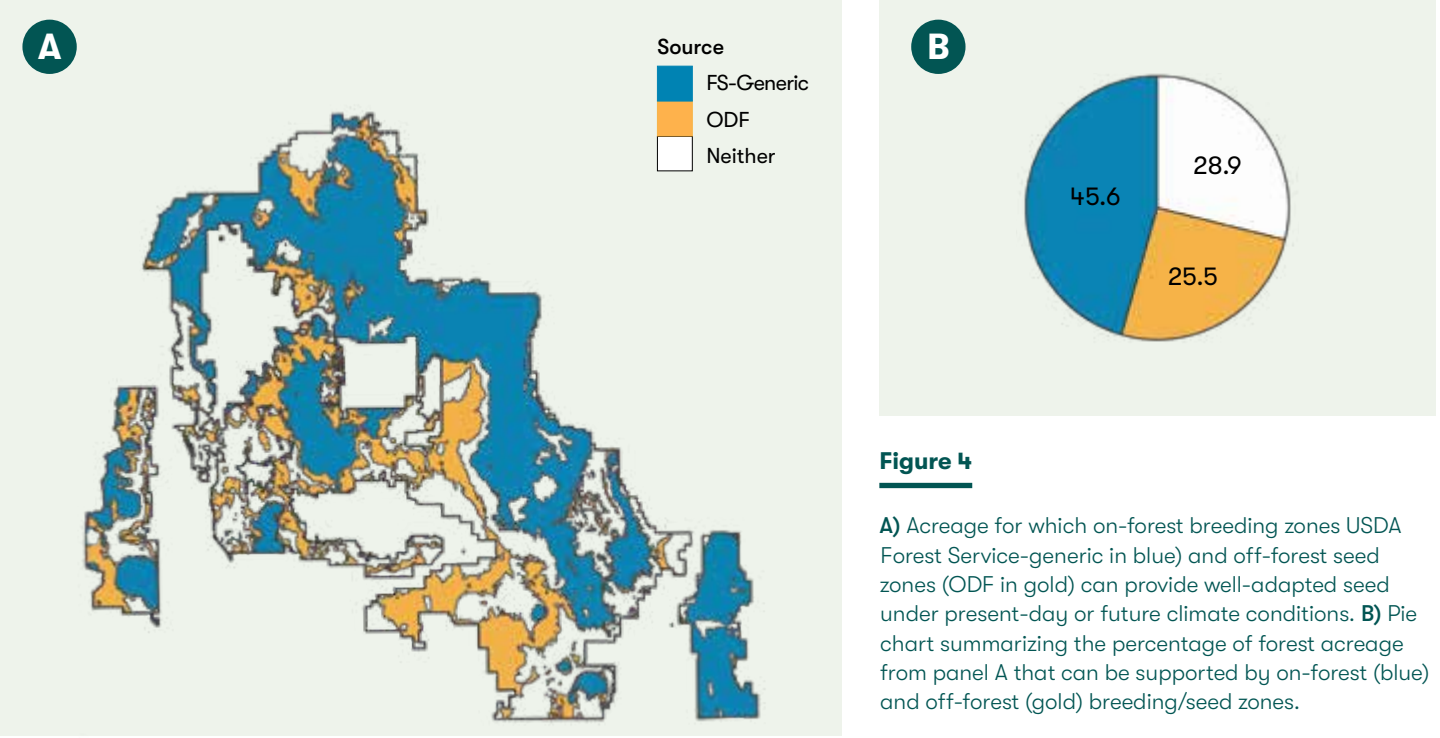

Figure 4

A) Acreage for which on-forest breeding zones USDA Forest Service-generic in blue) and off-forest seed zones (ODF in gold) can provide well-adapted seed under present-day or future climate conditions. **B)** Pie chart summarizing the percentage of forest acreage from panel A that can be supported by on-forest (blue) and off-forest (gold) breeding/seed zones.

Less than 25% was considered greatly mismatched, and if 0% of the zone remained within the transfer limit, the zone was considered completely mismatched.

Alarmingly, all 27 of the zones on the Fre-Win were mismatched to some degree, with 92% (25 out of 27 zones) categorized as at least moderately mismatched, and a third (9 out of 27 zones) categorized as completely mismatched (**Figure 3B**). Thus, when considering just empirical climate change to date, the climate conditions that tree populations are currently experiencing on the Fre-Win are largely no longer representative of the historic conditions to which those populations are adapted.

This further supports the notion that tree populations on the Fre-Win are likely already well on their way towards experiencing the consequences of maladaptation, if they are not already experiencing them. This is a possibility that demands investigation experimentally.

These climate-matching approaches can be used to counter the alarming extent of climate mismatch observed on the Fre-Win. Specifically, given that the transfer limits established above for each zone represent the conditions to which populations within those zones are adapted, those same transfer limits can be used to identify areas outside of the geographic boundaries of the zone that fall within the transfer limit under present-day climate or under future climate projections. In doing so, it will be possible to help populations track the climate conditions they are adapted to as they shift across the landscape, which will directly counter maladaptation.

To employ this approach, climate-matched acreage was identified across all of Klamath and Lake Counties (i.e. acreage falling within the transfer limit) for each seed or breeding zone in those same counties. This was completed for present-day climate and future climate projections for early century (2010–2040), mid-century (2041–2070) and late century (2071-2100). These future climate projections followed the representative concentration pathways (RCPs) 4.5 and 8.5, which are two possible climate projections that assume either moderate carbon emission mitigation strategies taken within the 21st century, or the absence of carbon emission mitigation strategies during that time, respectively (IPCC, 2014).

Once climate-matched acreage was identified for each zone under each climate condition, two questions were then asked: what percentage of the Fre-Win is supported by on-forest breeding zones under present-day or future climate, and how might off-forest collections provide additional support?

To answer these questions, the maximum extent of climate-matched acreage across all on-forest breeding zones and all climate conditions was assessed. The same assessment was then carried out for off-forest seed zones. The results of this analysis revealed that climate conditions on the Fre-Win have changed so dramatically in the last 30 years that over half of the forest is no longer within the historic range of variation of any on-forest breeding zones (**Figure 4**), and by mid-century the entire forest will be outside of the historic range of variation of on-forest zones.

Patriot Restoration (PROPS) collecting cones using a bucket truck

These results suggest that the Fre-Win must look outside of the forest boundary to find seed sources that are well adapted to the conditions that currently occur across much of the forest.

Fortunately, off-forest seed sources that could provide well-adapted seed for those conditions do exist, many of which are at slightly lower elevations and/or just to the south of the Fre-Win. Indeed, off-forest seed sources could provide well-adapted seed for much of the area that isn't supported by on-forest breeding zones (**Figure 4**).

These results strongly support the need to establish collaborative cone collection agreements with other agencies and organizations that manage the land surrounding the Fre-Win. Such agreements would enable the collection of more drought-tolerant seed that is better-adapted to the hotter and drier conditions that are the new norm on the Fre-Win.

To help guide cross-boundary seed collection and deployment efforts, pair-wise climate match was quantified for each seed/breeding zone in Klamath and Lake Counties under each climate projection. The results of this analysis accomplished two things. First, it allowed land managers to identify alternative seed sources for planting sites within every seed/breeding zone in south central Oregon. In other words, if there is not enough seed inventory to cover the planting need within a certain zone, this analysis provides the means to identify alternative seed sources that can be used to provide well-adapted seed for those planting efforts. Second, land managers can estimate the overall reforestation potential for seed collected from any seed/breeding zone in Klamath and Lake Counties for their organization by summing the overall amount of matched acreage for each seed/breeding zone across the land base (e.g. across the entire forest for the Fre-Win) under each climate condition.

This analysis can then be used to rank seed/breeding zones for prioritization during cone collection efforts. For the Fre-Win, this analysis was carried out by summarizing matched acreage across the whole forest, and by summarizing matched acreage across the specific planting targets identified within their existing planting backlog.

The objective of this approach was to ensure that the Fre-Win could not only identify high-priority collection areas to target to fill their existing planting backlog, but it could also help build a seed inventory that will allow the Fre-Win to respond to future reforestation needs — no matter where disturbances may occur on the forest. Thus, these analyses together provided a means to prioritize on-forest and off-forest collection efforts, including the large-scale collection effort that took place in Klamath and Lake Counties in 2024.

AMY MARKUS / USDA FOREST SERVICE

Lessons Learned

Use climate-matching approaches to assess the risk of maladaptation at the breeding-zone and forest level and to identify suitable alternative seed sources for those areas.

Conduct analyses well before planned implementation, given the length of each analysis. In the case of the Fre-Win, these analyses took roughly 4–6 months to perform.

Matt Anspach,
Federal Forest Restoration Coordinator, Oregon Department of Forestry

3

Partnerships and agreements

ON THE FRE-WIN, there is a long history of collaboration to accomplish high-priority work. For example, the Fre-Win has been collaborating with ODF through multiple Good Neighbor Authority agreements and has several stewardship, participating and challenge cost-share agreements with other partners. Through these agreements, partners are accomplishing high-priority work on the Fre-Win to increase the pace and scale of restoration. There is also a strong shared stewardship program in which partners are working together across ownership boundaries to address shared challenges such as wildfire risk reduction, restoring forest health for long-term resiliency, reforestation and conifer seed shortages. Throughout many years of collaboration, our partners have proven to be capable, knowledgeable and share the same interest in restoring public and private lands.

Due to the long, successful history of collaboration, the concept of having partners assist with cone surveys and collection was a natural solution to scaling collection efforts. There was confidence that partners could be trained using USDA Forest Service protocols and contribute to surveys and collection, especially in years with high cone crops. As with other restoration work, partners could assist by adding capacity to a USDA Forest Service program that has lost considerable knowledge and capacity over the last 20+ years. Not only does this approach bring additional staffing, but partners can oversee their own climbing contracts and/or renting and operating boom trucks for collection. This would be additive to USDA Forest Service contracts or force account climbers, which ultimately results in increasing the scale of collection.

If data suggests potential for a large cone crop and maximizing collection through partnerships is a goal, it is important to inform regional contacts, such as silviculturists, geneticists and natural resource staff, to help facilitate funding, training and the ability to outsource needs to the region.

Steps to building a successful partnership:

1

Identify and communicate with potential partners

Identity all partners who may have the capacity, knowledge and interest in assisting with surveys and collection. Reach out to each of these potential partners and discuss the needs, what the work entails, timelines and the support provided by the USDA Forest Service such as training. Remember, there are areas in which partners could assist beyond surveys and collection, such as transport, use of private extractories, purchasing supplies, storage space, etc.

2

Secure funding

Determine the amount of funding needed for each partner based on what and how they plan to contribute to the effort. Work with the USDA Forest Service and Regional Offices to secure funding. Be creative in all potential funding sources, such as appropriated, disaster relief, reforestation trust funds, priority wildfire landscape funding and others as applicable.

3

Develop agreements

Determine the most appropriate agreement type based on the arrangement with each partner. On the Fre-Win, Good Neighbor Authority, stewardship and participating agreements were used. Drafting agreements for this type of work for the first time can take time, so it is recommended that you start early (during the winter months) and strive to have them completed well before the survey and collection season begins. It is very helpful to have the Regional and Area Geneticists assist with drafting the language for the agreements, such as the scope of work and specifications for project work. Build a financial plan that funds all potential efforts the partner may assist with to allow for flexibility during the collection. There are always unanticipated needs during cone collection, and partners are often very nimble in their ability to help. Lastly, if there is any potential for a partner to collect on private lands, be sure to cite the Wyden Authority in the agreement.

Fre-Win Partners

American Forests

Oregon Department of Forestry

Collins

PROPS

ACRE

Green Diamond

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Patriot Restoration (PROPS) collecting cones using a bucket truck

Lessons Learned

Work with regional contacts early in the process.

Identify funding sources early in the fiscal year.

Finalize agreements early (during the winter months).

Consider working with local industry partners. They are extremely knowledgeable and have a shared interest in helping to increase the local seed bank.

Ensure agreements span multiple years.

Build flexibility into financial plans to accommodate shifting needs. Partners can help with more than surveys and collection, such as supply purchase, storage space, transport, private extractories, etc.

Cite Wyden Authority in agreements if there's any potential for collection on private land.

Fremont-Winema National Forest and surrounding community of Lakeview, Oregon

4

Private land collections

AS DESCRIBED IN **Section 2**, the Fre-Win must look beyond forest boundaries to find seed sources that are well adapted to the conditions that currently occur across much of the forest. Through established partnerships and climate-match modeling, the Fre-Win identified key areas of interest on private non-industrial lands where seed collection could address gaps in the existing Fre-Win seed shortage. These properties played a critical role in the 2024 cone collection effort. Utilizing Good Neighbor Authority (see **Section 3**), federal funding allowed cone collection on private lands to benefit federal lands.

The 2024 effort was the first attempt in Klamath and Lake Counties to collect seed for reforestation for non-industrial private land needs. Utilizing state and private funds allocated to ODF, a portion of the seed collected in 2024 was added to the state seed bank for use on non-industrial private lands.

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Step-by-step cone collection process for non-industrial private lands:

1

Identify potential non-industrial private lands

The climate modeling described in **Section 2** provided a map of the potential non-industrial private lands in Klamath and Lake Counties that were a suitable climate match. Each property was assigned a seed and/or breeding zone and ranked based on both current and future reforestation needs.

2

Identify local partners and facilitate contact with key landowners

Local partners identified landowners who were likely to provide permission and ranked as a high-priority climate match. Landowners were then contacted by local partners, who in most cases had an existing relationship with the landowner. The local partner explained the importance of cone collection for reforesting both federal and private lands, as well as the cone survey and collection process, and timing of collection. A list of landowners that provided permission was established. Each property was then surveyed following the cone survey process outlined in **Section 5**. In the 2024 season, cone collection occurred on seven private properties.

3

Determine in advance the proportion of cones for private and federal land

Before collection began, the percentage of cones that would be for non-industrial and/or federal seed based on priority, seed gaps and funding for each individual property was determined. This was planned in advance of collection based upon the expected number of bushels collected on each property calculated from survey data.

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Justin Delgado, *North Cascades Smokejumber, USDA Forest Service*

Lessons Learned

Communicate with the state seed bank so they have an awareness of pending collection and to ensure availability of seed for non-industrial private landowners.

Identify multiple potential collection sites on private land to account for situations in which cone crops may flare or become unavailable.

Ponderosa pine cone

5

Cone surveys

CONE SURVEYS ARE used to determine if a crop is sufficient enough to warrant collecting, as well as to estimate budget and extractory needs. This information is summarized in the cone collection, which estimates potential crops (bushels) by breeding zone. Anticipated collections are prioritized using the seed-use plan developed by each forest. Working Capital Funds (WCF) are then distributed to forests based on need.

Survey methods have varied over time. In the past, the Fre-Win used maps to locate areas worthy of a collection, but it could be cumbersome to combine surveys from people on different districts or crews. Recently, the Fre-Win has transitioned to the use of Avenza maps to document potential collection sites. This works much better as surveyors could download their files to GIS and have all surveyed data in one location. But even with this method, it could be difficult to project all collected data on one map.

With the heavy crop in 2024, partners and neighbors were also interested in survey results. It was ideal to have data collectively available to all partners so areas could be allocated to each partner based upon seed needs. After discussing the merits of Survey123, American Forests took the lead and developed a specific program for this app. The link was shared with partners for use during the survey season. Survey information was populated in "ArcGIS Online" which provided a snapshot of survey results on federal and private lands across Klamath and Lake Counties. This data was used to roughly estimate the number of bushels of cones per breeding zone and private property which informed budgets and extractory needs. Currently, stakeholders are using a combination of Survey123, developed by American Forest, and a USDA Forest Service Region 6 application called "Quick Capture," which links with Survey123 to display all survey data on ArcGIS Online for all to utilize.

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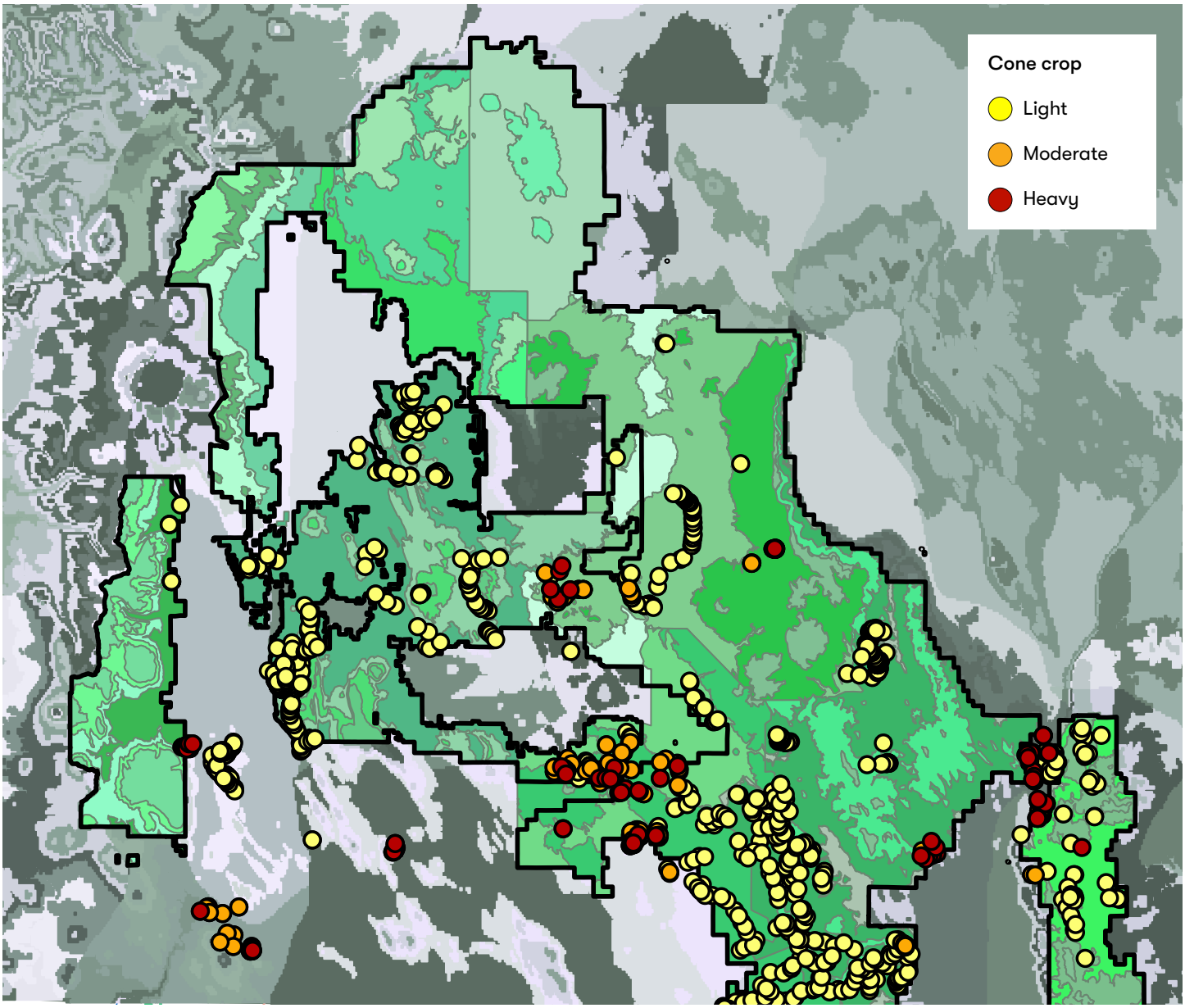

Figure 5

Points collected by partners and neighbors including, Collins Pine, Green Diamond, ODF, American Forests and the USDA Forest Service. Surveys were conducted on USDA Forest Service, industrial private, non-industrial private and state lands. Survey123 is uniquely adapted to map points off USDA Forest Service lands with sufficient map details for follow-up surveys and collection.

Survey123 App

The survey123 app used in 2024 provided a much-needed advancement in streamlining cone surveys across partners and landowners. However, we believe cone surveys can be streamlined further. The Region 6 genetics team is currently developing a mobile app for use in the 2025 cone survey season using ESRI quick capture. This app automates the process of inputting quantified cone counts, tracks survey routes, and automatically records location data such as seed/breeding zone. The resulting survey data is automatically uploaded to a regional AGOL web map, allowing partners to see which routes have already been surveyed, and how cone crops for each species are shaping up across the region.

JOE SHAFER / AMERICAN FORESTS

Anders Erickson, *Reforestation Technician, American Forests*

Lessons Learned

Provide a place in the app to enter cone counts per tree (FSH 2409.26F) to standardize the estimated number of bushels.

Use the app to re-survey and monitor the cone crop as the summer progresses.

Provide adequate training for all partners involved with cone surveys on how to estimate number of bushels per tree.

Cone survey and collection training

6

Training

AN INITIAL TRAINING session was held in May 2024 at the ODF Office in Klamath Falls. Participants included ODF, the USDA Forest Service, American Forests and private industry. The session included informational trainings and discussions on cone development, tagging procedures and storage, as well as hands-on training during a field visit to review survey protocols and methods and a field trip to review equipment use and survey techniques.

Meetings were conducted weekly to keep the collective group updated on survey results. It became apparent that Lake and Klamath Counties produced an unusually productive cone crop and that continued monitoring of cone development was needed.

The regional geneticist, recognizing the importance of a successful collection, offered to host a training session, which ran between July 31-August 1, 2024. Topics included: surveying/monitoring, seed development, insects affecting cones (see **Appendix D**), tagging, bagging and bushel measuring procedures. This training brought partners, ODF, USDA Forest Service and American Forest crews together to ensue cone collection methods were standardized. This two-day session was well attended with an all-star cadre.

Shortly before cone collections began, several informal trainings were conducted to review assignments, logistics, collection areas and answer general questions. By the end of the training, everyone could recognize and understood the importance of embryo development!

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Lessons Learned

Ensure survey methods include cone counts which translate into bushels. The estimates we used were not as accurate as actually counting cones (FSH 2409.26F).

Use Survey123 or ESRI Quick Capture to provide a shared platform for all.

Conduct additional trainings early to establish more effective protocols. An additional training focused on seed ripeness could be given as cones mature.

Morning safety briefing

7

Safety, organization and logistics

As the size and complexity of any undertaking increases, it is essential to develop a well-organized plan to accomplish goals. The Fre-Win realized that the scope and complexity of this project was extensive and would require a strategic and detailed plan. The "Cone Collection Action Plan" (**Appendix A**) was developed to address this need. The Action Plan was designed to be utilized both internally and externally, providing detailed information regarding safety and collection procedures.

The first step in developing the Action Plan was to develop a flow chart identifying positions. The chart was robust and included positions with skills Fre-Win staff did not have. With the assistance of the Region, the Fre-Win outreached these opportunities nation-wide. Key positions were filled in this manner.

Contracting Officer Representatives (CORs), primary contacts and other key personnel, such as cone care managers, logistics coordinators and safety officers, met in person and virtually to work through the sequential steps of cone collection. This was necessary as many did not have experience with cone collecting, which was not unexpected given our last large collection was 15–20 years ago. These meetings were productive and identified issues that had not been considered, such as cone handling, tagging, storage, climbing protocols and more. Questions were answered and training needs were identified, resulting in the two-day training discussed in **Section 6**.

As the organization grew, logistical challenges also increased. The organizational chart listed 50–60 people dedicated to field work across the Fre-Win, utilizing 20–25 vehicles, one stake side and four boom trucks. Individuals and crews would typically drive 50–300 miles a day. Working schedules varied but averaged 12 hours a day, six days a week, over a 3–4-week period. Cumulatively, this represented approximately 60,000 miles driven and 12,000 hours worked.

In addition to logistical challenges, safety was critical to address early in the process. The Fre-Win integrated safety early in project development.

Our Forest Safety Officer joined the team and developed a comprehensive safety plan, including daily safety meetings with each functional group before work began each morning, as shown in the picture on the left.

Project success was defined as having no serious injuries and collecting productively. This mantra was repeated throughout the project with success.

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Organization and safety were driving factors in the development of the Action Plan. However, there were many other components, including:

Cone collection guidelines

Establish protocols for collections, including suitable trees to collect from, climbing equipment specifications, cone sampling methods and bagging procedures.

Organizational chart

List positions with names and responsibility.

Safety plan

Review radio communications with a map of repeaters and frequencies. Display contact information for each district, Supervisors Office and Lakeview Inter-agency Office dispatch. Establish check-in and check-out procedures.

Contact list

List all contacts associated with the project, including contractors, partners, USDA Forest Service personnel on and off forest to include name, phone number, email, and forest or company association.

Flagging designations

Use flagging designations on each bushel to differentiate lots, using a specific color for each collection zone, to assist with bushel count at the end of the day as well as to identify lots during shipping to the extractory.

Tagging and labeling instructions

Establish a standardized tagging process and provide examples of proper tagging and demonstrate them in the training.

Forest vicinity and project area maps

Include vicinity maps for off-forest contacts for orientation. Note: A full packet of vicinity and project area maps were made available.

Maps of heli-spot locations

Augment safety plan to provide maps and the latitude/longitude of heli-spot locations.

Medical facilities

List local and area medical facilities with address and contact number along with facilities and capabilities.

Medical incident report

Guide personnel on proper radio protocol if an incident occurs.

See **Appendix A** for an example of the complete USDA Forest Service Cone Collection Action Plan developed for the 2024 cone collection effort on the Fre-Win. This Action Plan was written in a similar organized format to an Incident Action Plan, which is used for wildfire response organization and includes all necessary incident information for resource response and safety. A Cone Collection Action Plan should include all necessary cone collection information to complete a successful collection while maintaining the safety of all individuals involved.

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Cone survey and collection training

Lessons Learned

Require all contractors and partners to have **daily safety briefings**.

Include a **run-through of a medical emergency** scenario as part of the daily safety briefing.

Consolidate all safety information into one document to provide consistency to all those involved.

Develop maps knowing there will be many **off-forest staff with no knowledge of the local area**.

Important safety lesson learned:

Ensure ground support personnel are **NOT** underneath a tree when a climber is in it. This will help to avoid the risk of personnel being struck by an object falling from the tree.

Example: An author of this report witnessed a climber drop a knife, which was being used to cut cones, from about 50 feet up in a tree. Luckily, no personnel was beneath the tree, but the “near miss” underscores the importance of keeping the grounds clear while climbers work.

Bushel of ponderosa pine cones

8

Cone collection

CONE CROPS ARE difficult to predict. When a viable crop emerges, mobilizing resources within a short time frame can be challenging. In the past, the Fre-Win has relied on contracting and force account climbers to collect cones. Both are effective collection approaches; however, there are limitations. Typically, productive cone years occur over large landscapes covering multiple forests. As the demand for cone collection increases, both force account and contracting crews may become limited. This has limited our ability to conduct sizable collections in the past.

The Fre-Win was fortunate in that we had partnerships established. This added capacity complimented existing resources. Based on cone surveys and monitoring, each partner, contractor and USDA Forest Service crew was placed in an area where cones were plentiful and seed was needed. With a COR or primary contact, goals of each collection area were discussed, and each group worked independently of others, determining their work own schedule.

NANCY FLOYD

Utilize all tools

To maximize the number of cones collected, the Fre-Win utilized contracts, force account climbing and partnerships. In our case, we utilized two USDA Forest Service contractors, a cadre of force account climbers, four partners consisting of three climbing groups, and a bucket truck operation, detailed in **Table 1**.

Table 1 USDA Forest Service seed collected in 2024

Partner	Method	Funds Used	Funding Source	# of Bushels Collected	Cost/ Bushel
USDA Forest Service	Climbing contract	$40,086	WCF	276	$145
USDA Forest Service	Climbing contract	$42,720	WCF	336	$127
USDA Forest Service	Force account climbers	$50,000*	WCF	184	$271
Oregon Department of Forestry	Climbing contract	$88,358	Disaster relief	594	$148
American Forests	Climbing contract	$94,280**	Disaster relief	111	$849
Alliance for Conservation, Restoration, and Ecology	Climbing contract	$201,600	Disaster relief & RTRT	576	$350
Patriot Restoration PROPS	4 bucket trucks	$136,700	Disaster relief	534	$255
		Total $653,744		**2,611 bushels**	**Average $250/ bushel**

*Estimated costs of force account climbing team

**Two factors contributed to the higher cost: 1) This contractor was new to cone collection and part of the objective was to expand the list of available cone collection contractors; and 2) this contractor arrived a week later than the other partners, so they collected in areas with lower densities of trees per acre and/or cones.

Each of these contributed synergistically to the collection process. In summary, the tools used included:

1 Force account climbing crews

Outreach notices were posted across the country. Crew availability was limited but had a revolving group of up to eight climbers. They were enthusiastic and practiced safe climbing techniques. Their focus was on genetic sites and areas not thoroughly picked by partners. Quality of picking, bagging and tagging were outstanding. With climbing instructors, this was both a training and teaching moment for many on the crew.

2 Contract climbers

The Fre-Win utilized two existing cone collection contracts. Off-forest mentors were assigned to each contract to assist forest CORs who had not previously been involved with cone collection contracts. Contractors were productive and met specifications.

3 Oregon Department of Forestry (ODF)

ODF completed surveys on private lands identified as a valuable climate match for the Fre-Win. ODF solicited and awarded a contract to collect cones. They administered the contract, bagged and tagged bushels, transported to the cooler, and cared for cones while in storage (including turning bushel bags).

4 American Forests

Utilizing our existing participating agreement, American Forests was a key partner in the cone collection contract. American Forests conducted cone surveys leading up to the collection effort, which was instrumental in identifying priority areas for collection. They reached out to a forestry contractor in Utah, which they had worked with previously, and independently established a contract for the contractor to climb on the Fre-Win. The contractor provided 10 climbers for a 10-day period. The four-person crew on forest from American Forests served as inspectors and were instrumental throughout the collection project. In addition, American Forests secured a national news story with CBS Evening News, highlighting the need for cone collection and reforestation efforts on national forests.

5 Alliance for Conservation, Restoration, and Ecology (ACRE)

Utilizing our existing stewardship agreement, ACRE scouted in advance of collecting and provided valuable insights on productive areas. A crew of 15–20 climbers worked for 2–3 weeks. In addition, they moved racks from Stone Nursery to the forest at designated locations and assisted in returning them. Crews completed bagging and tagging as well as turning cones each day. ACRE also transported all their cones to Bend Seed Extractory.

6 Patriot Restoration Operations (PROPS)

Utilizing our existing stewardship agreement, PROPS offered the suggestion of renting bucket trucks to assist with cone collection. This was an approach we wanted to explore as it gave full access to the upper crown of trees. PROPS provided four boom trucks (two with 85-foot reach and two with 135-foot reach) with operators and pickers. Progress was tedious in the beginning, but production increased as crews became more experienced. This method worked very well to collect from trees along roads. Lateral reach was impressive, ranging from 50–75 feet.

Cross-boundary cone collection and reforestation

In Klamath and Lake Counties, local partners strive to reforest across landownership boundaries. In the long term, all partners are working towards regrowing a forest across ownership boundaries for future forest and watershed health as well as wildlife habitat. The collaboration around cone collection will result in a future forest across both federal and private lands. **Table 2** summarizes the cone collection for private lands. When combining both federal and private land seed, a total of 6,286 bushels were collected in 2024!

Table 2 Private land seed collected in 2024

Partner	Seed deployment locations	Number of bushels collected
Oregon Department of Forestry	Non-industrial private lands	194 bushels
Collins Pine	Collins Pine private lands	1,800 bushels
Green Diamond Resource Company	Green Diamond Resource Company private land	1,400 bushels
Bureau of Land Management	BLM land	281 bushels
		Total 3,675 bushels

Table 4 Data for all USDA Forest Service seed collected by the Forest Service and all partners

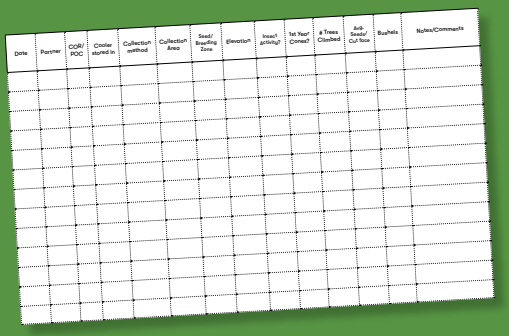
Species	Total Weight (lbs.)	Seeds/lb (#)	Average Purity (%)	Average Filled Seed (%)	Average Germination (%)
Ponderosa Pine	3,544	7,868	99.2	98.4	93.4
Sugar Pine	101	1,997	99	98	100

Table 3 Examples of partner support during collection

Partner	
ODF	• Purchased bags, labels and zip ties • Turned bags at BLM cooler by utilizing fire staff • Surveyed for cones on private land • Obtained permission from landowners • Solicited, awarded and administered a climbing contract
American Forests	• Surveyed for cones on federal land • Rented a stake bed pickup truck • Purchased supplies as needed • Set up Survey123 application for cone surveys • Solicited, awarded and administered a climbing contract
Alliance for Restoration, Conservation, and Ecology	• Transported racks from nursery to USDA Forest Service tree coolers • Transported cones to Bend Seed Extractory • Monitored cone crops in their collection area • Provided burlap bags for collection • Collected cones using a climbing crew
Patriot Restoration	• Hand-made 20 cone cutters • Made arrangements for four boom trucks to be on site with crews and safety measures in place
Collins Pine	• Shared cone survey results with Survey123 • Utilized the local cone storage facility for 128 bushels after the USDA Forest Service cooler was full • Transported cones to private extractory • Processed USDA Forest Service and non-industrial private seed at private extractory • Collected 8 bushels of state seed
Bureau of Land Management	• Allowed ODF to use BLM tree cooler to store 543 bushels of cones
Green Diamond Resource Company	• Gave permission for cooler use if needed • Helped facilitate collection on BLM lands through sharing of contractor contacts

Example of collaboration in action

In the first few days of collection, it was discovered that the bags sent by the extractory and ordered by ODF were too small. The bags could only hold a half bushel, resulting in twice the number of labels, and bags needed, as well as twice the bags to flip each day, etc. ODF was able to call the company where they purchased 5,000 bags and exchange them for the larger bags. The next day, American Forests drove the remaining small bags to Reno, Nev., (4-hour drive one way) using the stake bed pickup rental to exchange the bags and drove back the same day with the new bags. All partners were quickly back on track using the correct burlap sacks thanks to an all-hands, collaborative approach to problem solving



Tracking collection and storage with a daily log

A log was used in the field at the end of each day to track and summarize collection on a daily basis. Each partner/ contract representative entered the data into the spreadsheet that was accessible in Google Sheets, which was easy for everyone to access from their phone or computer for quick entry. This made it easy to track total bushels collected by seed zone and storage capacity.

Overflow storage at the Collins Pine warehouse

9

Cone storage and transport

THIS YEAR WAS exceptionally productive for ponderosa pine cones on the Fre-Win. With such a large crop, cone storage and care were logistically challenging. Historically with smaller collections, a single tree cooler can be designated to store cones and care for them during the drying cycle. These collections typically ranged from 50–400 bushels per year over the last 10+ years.

In 2024, cone surveys were started in early May when the conelets were first evident. Crews initially thought it would be an average cone collection year. However, subsequent follow-up surveys as cone development became more evident revealed an extraordinary cone crop, which only happens once every several decades on the Fre-Win. In addition, the initial seed counts on developing cones were excellent with 10–14 seeds per cut face. Data from our surveys was used to complete the cone procurement plan. The Fre-Win estimated 2,500 bushels could be collected, which provided a starting point to begin assessing the facilities for cone storage.

Typically, bushels are stored on racks (also used for delivering seedlings) stacked three high to reduce workload and prevent potential back injuries from lifting bushels up to the fourth tier. The Fre-Win's tree coolers offer ideal storage, with fans to provide air flow for drying. Each cooler planned for use was measured, and the appropriate number of racks were estimated to determine the bushel capacity of each cooler. Another factor for coordination was where the priority collection areas were in relation to a given cooler. **Table 5** shows cooler capacity and the anticipated bushels collected from USDA Forest Service and private lands.

Additional storage was needed for cones collected on private land by ODF, and BLM offered their tree cooler for excess cone storage needs.

After analyzing the anticipated space required, appropriate storage capacity was coordinated. It is advantageous to have back-up plans in place, such as using pallets with tarps or finding other storage facilities as alternate options.

AMY MARKUS / USDA FOREST SERVICE

To set up each cooler, the first step was to get racks shipped from Stone Nursery (Medford, Ore.). This was a difficult task as we needed over 400 racks. Fortunately, our partners were able to assist with this effort. In this case, ACRE offered to move the racks for us. They coordinated with the nursery and made four separate trips to install racks in each of our coolers. The Chiloquin cooler was under construction, so an alternate location was found in an open-air covered building for snow mobiles and fire equipment. The fire crew cleared the space for racks. This worked well as fans were not required, and the drying process took place naturally. Once the racks were installed (three-tiers high), several industrial fans were placed in each cooler to provide air flow for drying. Extension cords were duct taped to the floor to reduce tripping hazards.

Securing adequate storage space is the first step to caring for cones. The next step is turning the bushel bags every day to facilitate drying. Cones recently picked are relatively heavy due to high moisture content, a cooler full of "wet" cones will produce high humidities within a cooler, even in the arid conditions of the Fre-Win. A bushel of cones tends to dry unevenly with cones on the outside drying faster than the center. Turning the bags moves cones around and facilitates even drying.

The responsibility of turning cones was given to cooler managers at each site. USDA Forest Service personnel oversaw the Lakeview, Bly and Paisley coolers, ACRE managed the Chiloquin coolers, and ODF fire crews oversaw the BLM cooler.

Tree cooler storage at the Lakeview Ranger District, Fremont-Winema National Forest

LINDSEY WINKEL / USDA FOREST SERVIC

Table 5 Storage capacity

Tree cooler	Storage capacity (# bushels)	Anticipated (# bushels)	Actual (# bushels)
Lakeview	600	800	637 (FS)
Paisley	*600	0	194 (FS & Pvt)
Bly	450	600	675 (FS)
Chiloquin	600	600	573 (FS)
BLM	400	400	543 (FS & Pvt)
Collins	Not initially expected to use		128 (FS and Pvt)
Totals	1,650	2,000	2,750 (total FS & Pvt)

*Paisley used as overflow from Lakeview

As cone collection began, storage space in coolers appeared adequate. However, as collections continued, some coolers began to reach capacity. The Bly cooler had extra racks, which were placed under the covered loading dock. This extra space was enough for the rest of the collection. Chiloquin storage area had the capacity to store all bushels collected. By the end of collection, Lakeview was over capacity, with excess space in the cooler facility being filled with pallets and extra racks and, thus, remaining bushels were shipped to Paisley. In addition, bushels were also stored at Collins Pine in a warehouse on pallets during the last week of collection.

Rodents were a concern during storage, so fabric barriers were placed across the doors to the tree coolers to prevent damage. This method worked well; however, some rodent damage was noted. Cones stored on pallets were most susceptible. A few bushels were lost while the majority could be re-bagged and tagged. The open storage in Chiloquin was also susceptible to rodent damage; however, there were several cats on the compound that assumed the role of cone protectors. Several bags were affected, but there was minor damage overall.

Once the cones were dry, the Bend Seed Extractory was contacted, and shipments were scheduled. ACRE transported the Chiloquin cones in one load (570 bushels) and transported another load from Bly (500 Bushels). Private land collections in Lakeview (USDA Forest Service and private seed) were taken to IFA Nurseries Inc in Camby, Ore., by Collins Pine for extraction. The remainder was taken in several trips by American Forests crews with a rented stake side as well as USDA Forest Service personnel with trailers.

Feedback from Bend Seed Extractory indicated the cones were dried and flared appropriately without mold.

Lessons Learned

Develop a back-up plan for additional storage if the collection is higher than anticipated.

Designate a vehicle (i.e. stake side pickup) to transport cones as needed.

Identify one person to manage each cooler.

Utilize partners for logistics such as storage, turning bags, rack transport, etc.

Utilize private extractories as needed if they are reputable and funding is available.

Purchase multiple large fans for each cooler well in advance.

Track how many bushels enter each cooler daily using the daily collection log (described in Section 8).

Ponderosa pine tree on the
Fremont-Winema National Forest

10

Conclusion

CLIMATE CHANGE IS resulting in rapidly shifting environmental conditions across Region 6. In south central Oregon, increases in summer aridity has resulted in more drought-prone conditions. This has not only contributed to an increase in large-scale fires across this area, but it is also resulting in local forest tree populations starting to become maladapted. To counter maladaptation due to prolonged summer drought, seed may be collected from more drought-tolerant populations. Our analyses reveal that, for the Fre-Win, such climate-adapted seed can often be found off-forest at lower elevations.

Our assessment of climate change on the Fre-Win enabled us to identify breeding zones that are at high risk of maladaptation and identify suitable collection areas to source climate-matched seed. It also laid the foundation for establishing partnerships with land managers at lower elevations that could be used to facilitate such collections. These partnerships, in turn, enabled an extensive cone collection effort in 2024, allowing the Fre-Win to make up a large portion of their current seed shortage.

Activating a large contingent of resources to collect within a relatively short period of time has been limiting for the USDA Forest Service in the past. This guide demonstrates that by considering the current and projected needs for reforestation in Region 6 — and by using the best available scientific tools — large-scale, multi-partner seed collections can be made possible. However, it is important to emphasize the lessons learned throughout this process, and how they may be used to improve similar collection efforts in the future.

Good luck in your cone collection efforts!

ANDREW STUDER / AMERICAN FORESTS

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Appendix

A Cone Collection Action Plan

B Collection Daily log

C Cone Collection Survey

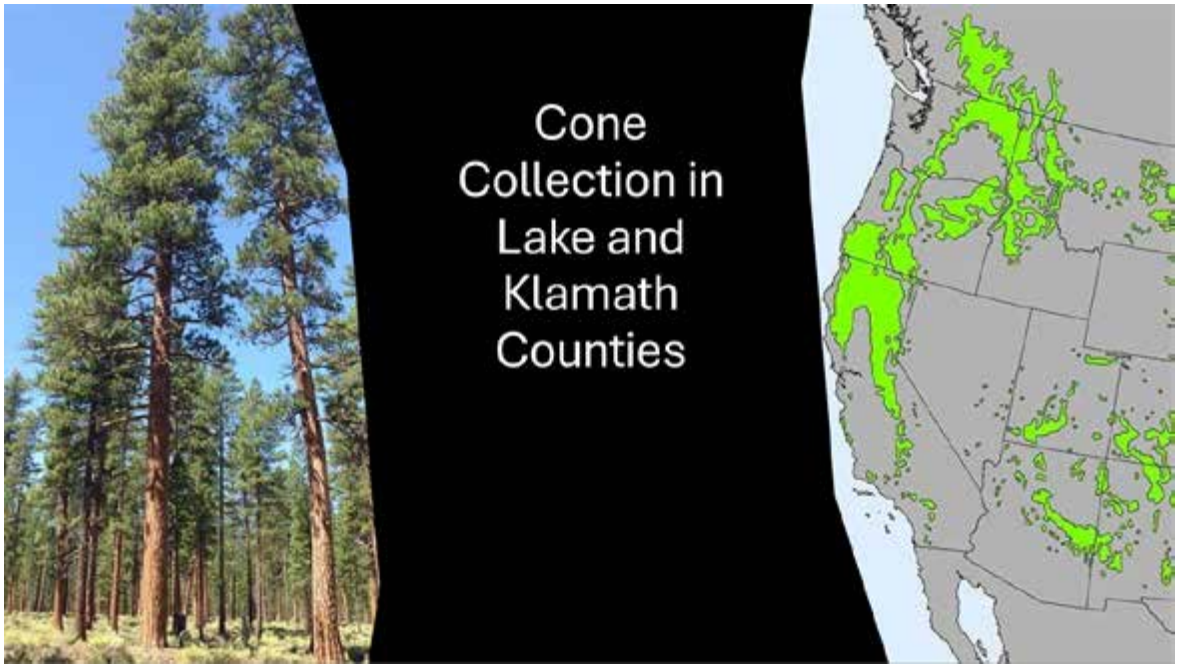
D Cone Collection Workshop

E Cone and Seed Ecology

Fremont-Winema National Forest
OR-FWF

Region 6 Forest 02

Cone Collection Action Plan



2024

Cone Collection Guidelines

- The FS representative will assist with evaluating cone maturity and quality. Cones will be sampled for seed count and insects before collecting from a tree.

- Each tree climbed should have the cones inspected for soundness and maturity. Cones will be sampled in the following manner:
  (1) A minimum of 4 cones will be picked randomly as the tree is climbed. The Contractor will pick 2 cones from the middle, and 2 from the top as sample cones to determine soundness and maturity.
  (2) Cones collected from (1) above will be sliced lengthwise to determine whether they contain an acceptable quantity of exposed, sound seed on one cut face. Minimum average number of percent sound and ripe seeds exposed on one cut face of cone should be a minimum of 4 seeds. Minimum amount of cone per tree to justify collecting is about a half of a bushel, with climber's input if the tree is safe and productive to climb.

- Seed are considered sound when the endosperm and embryo are developing normally and there is no evidence of insect, disease, or other types of damages. Seeds will have a hard brown seed coat; white, solid and nutlike kernel; a uniform cream or yellow colored embryo; the embryo fills 90% of the embryo cavity; and seed can be removed from cone scales without detaching the seed wing.

- Trees preferred for cone collection should have the following: good form, no senescence (dead/dying portions), minimal forks, and a relatively straight bole (stem).

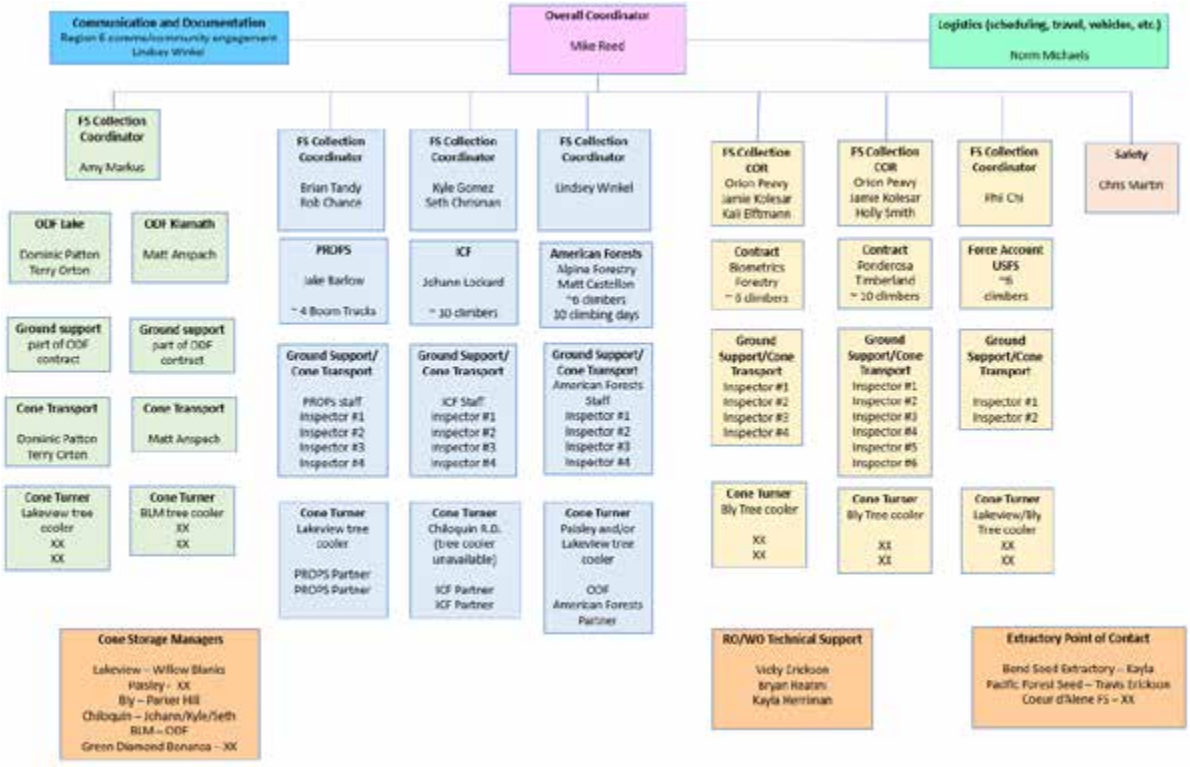
- Spurs will not be used for tree climbing. This is due to tree damage and forest health concerns.

- There is no minimum distance between trees for collection. Cones may be collected only from the upper 2/3 of the tree.

- Fill out a hard copy of the cone collection log for every collection day. At the end of each day, enter this daily cone collection data into the electronic daily cone collection log, which is stored on Google sheets.
  Link to electronic Google sheets:
  https://docs.google.com/spreadsheets/d/1j6DiQgILboPucm2r2KvOkUagDoPRzFZlQbmo1r9QYdk/edit?usp=sharing

- Each bushel bag will be labeled with a tag in a Ziplock bag inside the bag and a tag on the outside of the bag. Use a fine sharpie pen to complete tag information.

Organization of Cone Collection



Cone Collection Contact List

Agency/ Company	First Name	Last Name	Email	Position
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ACES	Rob	Chance		Coordinator
Alpine Forestry	Matt	Castellan	matt@alpineforestryutah.com	Contractor
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American Forests	Austin	Rose	arose@americanforests.org	Partner
American Forests	Bjorn	Erickson	berickson@americanforests.org	Partner
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USFS	Jason	Raabe	jason.raabe@usda.gov	Inspector
USFS	Jeremiah	Currington	jeremiah.currington@usda.gov	Inspector
USFS	Joanna	Fischer	joanna.fischer@usda.gov	Inspector
USFS	Jonathan	Arellano	jonathan.arellano@usda.gov	Inspector
USFS	Justin	Fowler	justin.fowler@usda.gov	Inspector
USFS	Kali	Elftmann	kali.elftmann@usda.gov	COR Inspector
USFS	Klynne	Weldon	klynne.weldon@usda.gov	Inspector
USFS	Kyle	Gomez	kyle.gomez@usda.gov	Coordinator-ICF
USFS	Leah	Gamble	leah.gamble@usda.gov	Inspector
USFS	Lindsey	Winkel	lindsey.m.winkel@usda.gov	Coordinator AF
USFS	Matt	Harrison	matthew.harrison@usda.gov	Inspector/Climber
USFS	Mike	Reed	robert.m.reed@usda.gov	Overall Coordinator
USFS	Orion	Peavy	orion.peavy@usda.gov	COR Mentor
USFS	Parker	Hill	parker.hill@usda.gov	Storage Manager-Bly
USFS	Phillip	Chi	phillip.chi@usda.gov	Climbing Coordinator
USFS	Rachael	Cilley	rachael.cilley@usda.gov	Inspector
USFS	River	Holmes	river.holmes@usda.gov	Inspector
USFS	Sandra	Klepadlo-Girdner	sandra.klepadlogirdner@usda.gov	Inspector
USFS	Scott	Schroeder	scott.schroeder@usda.gov	Cone Flipping
USFS	Sean	Maielua	sean.maielua@usda.gov	Inspector
USFS	Seth	Chrisman	seth.chrisman@usda.gov	Coordinator - ICF
USFS	Tyler	Ketcham	tyler.ketcham@usda.gov	Inspector
USFS	Willow	Blanks	willow.blanks@usda.gov	Inspector

Cone Collection Safety Plan

All Forest personnel will take part in a **morning meeting\briefing** before any climbing, cone collection or other work commences. This meeting will be to provide work assignments for the day as well as a Safety Brief and ensure communication measures are in place. **All safety briefings will be documented and filed in Pinyon.** All safety plans will be stored in Pinyon. All FS representatives will be familiar with the FS Safety Plan. Important information regarding communication, fire precautions, and safety will be communicated and included in the daily briefings. All personnel will also take part in a Daily close out before leaving the field. This will ensure accountability of all personnel, discuss any issues that may have arisen during the day as well as any safety issues that were discovered.

Safety inspections of equipment will be done before and after work. Tree climber will inspect their climbing equipment including ropes, harnesses, and ladders. Ropes, lanyards and harnesses will be looked at for tears rips or knicks that might compromise its integrity. All personnel will be required to wear all safety equipment deemed necessary, including, but not limited to, tree climbing helmet or hardhat for ground personnel, gloves, eye protection, and approved climbing gear in proper working condition. The spotter/group lead will ensure that all climbers always follow all safety guidelines during work in accordance with Fremont-Winema's Climbing JHA's. There are no exceptions to this. If any climber, spotter or personnel is committing actions that are unsafe and do not immediately remedy the actions, they will be required to leave the project area.

All personnel working in the field supporting this cone collection will be advised on communications, points of contact for emergencies, hospital locations and available medical services will be made available to them including travel times to those services and travel time from the unit/project location. The spotter working on the ground and supporting the climbing team will help ensure safe work practices and help with any work the climber might need help with such as moving ladders or equipment. There will always be a minimum of two employees working on harvesting cones and according to our JHA's, never be more than "shouting distance" apart. One climber will be on the ground and ready in case of a rescue of another climber. **No employees will work alone**. Additionally, at least 1 employee per group will be First Aid / CPR certified.

Points of Contact (POC) for each collection group will ensure that all resources have **checked in safely at the end of each workday**, then these POC of each collection group will then check-in at the end of each workday with the Cone Collection Overall Coordinator. Contractors that choose to work later in the day after USFS inspectors have left will have their own communication devices so that they can communicate with dispatch in case of emergency.

Off Forest Employees will be paired with an on-Forest Employee to ensure there is an on-Forest Vehicle used during work so that there is a vehicle radio that has repeaters already programed. The on-Forest employee will also have a handheld radio that has repeaters and frequencies already programed. This ensures direct contact not only for Medical Emergency's but also in case of Fires that may happen in and around a work area, allowing us to remove workers from the field without delay.

If there is a higher-level emergency, there will be 1 person responsible for the Overall scene and have radio contact / cell with dispatch. This will NOT be the same person that is administering field First Aid. Understand that this is not a competition to see who can collect more cones during the day. Please be aware of each other's climbing abilities and experience. This is a learning opportunity for some and just another day climbing a tree for others. Our levels of experience vary greatly with a group as large as this, so please **WATCH OUT** for each other and above all, **be helpful, respectful and SAFE!!**

Radio Communications Plan

West Zone Radio plan:

ZONE 10 Klamath County Area Administration						
CH	Description	Display	RX	Tone	TX	Tone
1	FWF Walker Mt Repeater	WALKER	170.525	103.5	162.750	141.3
2	FWF Applegate Bt Repeater	APPLE	170.600	103.5	163.6875	151.4
3	FWF Sw an Lake Pt Repeater	SWAN	170.600	103.5	163.6875	162.2
4	FWF Pelican Bt Repeater	PELICAN	171.1375	103.5	164.1375	162.2
5	FWF Hogback Mt Repeater	HOGBACK	171.1375	103.5	164.1375	151.4
6	FWF Chase Mt Repeater	CHASE	171.1375	103.5	164.1375	141.3
7	ODF Klamath Hamaker Mt Rptr	ODF HAM	151.205	131.8	159.375	131.8
8	ODF Klamath Yainax Bt Rptr	ODF KYX	151.205	131.8	159.375	141.3
9	ODF Klamath Welch Bt Rptr	ODF WEL	151.205	131.8	159.375	156.7
10	Forest Service Admin Tactical	PROJCT	168.675		168.675	
11	ODF Red Net Scene of Action	RED	151.340	156.7	151.340	156.7
12	Fremont-Winema Incident Tactical	IATAC1	167.625		167.625	
13	Fremont-Winema Tactical	IATAC2	167.450		167.450	
14	BLM Scene of Action	IATAC3	166.275		166.275	
15	OR05 Air to Ground 41	A/G 41	167.475		167.475	
16	Air Guard	AGUARD	168.625		168.625	110.9

* Blue Highlighted Boxes transmit and receive over a repeater.

East Zone Radio plan:

ZONE 12 Lake County Area Administration						
CH	Description	Display	RX	Tone	TX	Tone
1	FWF Bald Mt Repeater	BALD	171.700	103.5	165.225	151.4
2	FWF Picture Rock Repeater	PICROK	171.700	103.5	165.225	162.2
3	FWF Round Pass Repeater	RNDPAS	170.125	103.5	163.000	141.3
4	FWF Spodue Mt Repeater	SPODUE	169.925	103.5	163.375	162.2
5	FWF Grizzly Pk Repeater	GRIZZLY	169.925	103.5	163.375	151.4
6	FWF Drake Peak Repeater	DRAKE	169.925	103.5	163.375	141.3
7	Lakeview District BLM Direct	BLM DIR	173.8875		173.8875	131.8
8	Lakeview BLM Hart Mt Repeater	HART MT	173.8875		166.325	100.0
9	Lakeview BLM Green Mt Rptr	GREEN MT	173.8875		166.325	114.8
10	Lakeview BLM Yainax Bt Repeater	BLM YNX	173.8875		166.325	107.2
11	Lakeview BLM Hamaker Mt Rptr	BLM HAM	173.8875		166.325	123.0
12	Forest Service Admin Tactical	PROJCT	168.675		168.675	
13	Fremont-Winema Incident Tactical	IATAC1	167.625		167.625	
14	BLM Scene of Action	IATAC4	166.6375		166.6375	
15	Road Crew , NOT FIRE or SAFETY	RC 1	168.6125		168.6125	
16	Air Guard	AGUARD	168.625		168.625	110.9

Aviation Zone (only needed in case of emergency) Radio plan:

ZONE 11 AVIATION						
CH	Description	Display	RX	Tone	TX	Tone
1	LIFC Flight Follow Second S.E.	BADGER	169.625		164.525	146.2
2	LIFC Flight Follow Second South	SWAN	170.600	103.5	163.6875	162.2
3	LIFC Flight Follow Second North	WALKER	170.525	103.5	162.750	141.3
4	LIFC Flight Follow Second West	SPODUE	169.925	103.5	163.375	162.2
5	LIFC Flight Follow Second North	GREEN MT	173.8875		166.325	114.8
6	Fremont-Winema Incident Tactical	IATAC1	167.625		167.625	
7	BLM Scene of Action	IATAC3	166.275		166.275	
8	LIFC Local FF PRIMARY	LCL FF	167.175		167.175	
9	OR05 Air to Ground 41	A/G 41	167.475		167.475	
10	OR05 ODF Air to Ground 01	A/G 01	151.310	156.7	151.310	156.7
11	OR05 Air to Ground 24	A/G 24	168.6375		168.6375	
12	OR04 Air to Ground 61	A/G 61	169.2875		169.2875	
13	Pri	VMED28 HEAR1	155.340		155.340	156.7
14	Air Evac EMS 29	VMED29	155.3475		155.3475	156.7
15	Air Evac HEAR 2, MedNet Second	HEAR2 MdNt2	155.400		155.400	
16	Air Guard	AGUARD	168.625		168.625	110.9

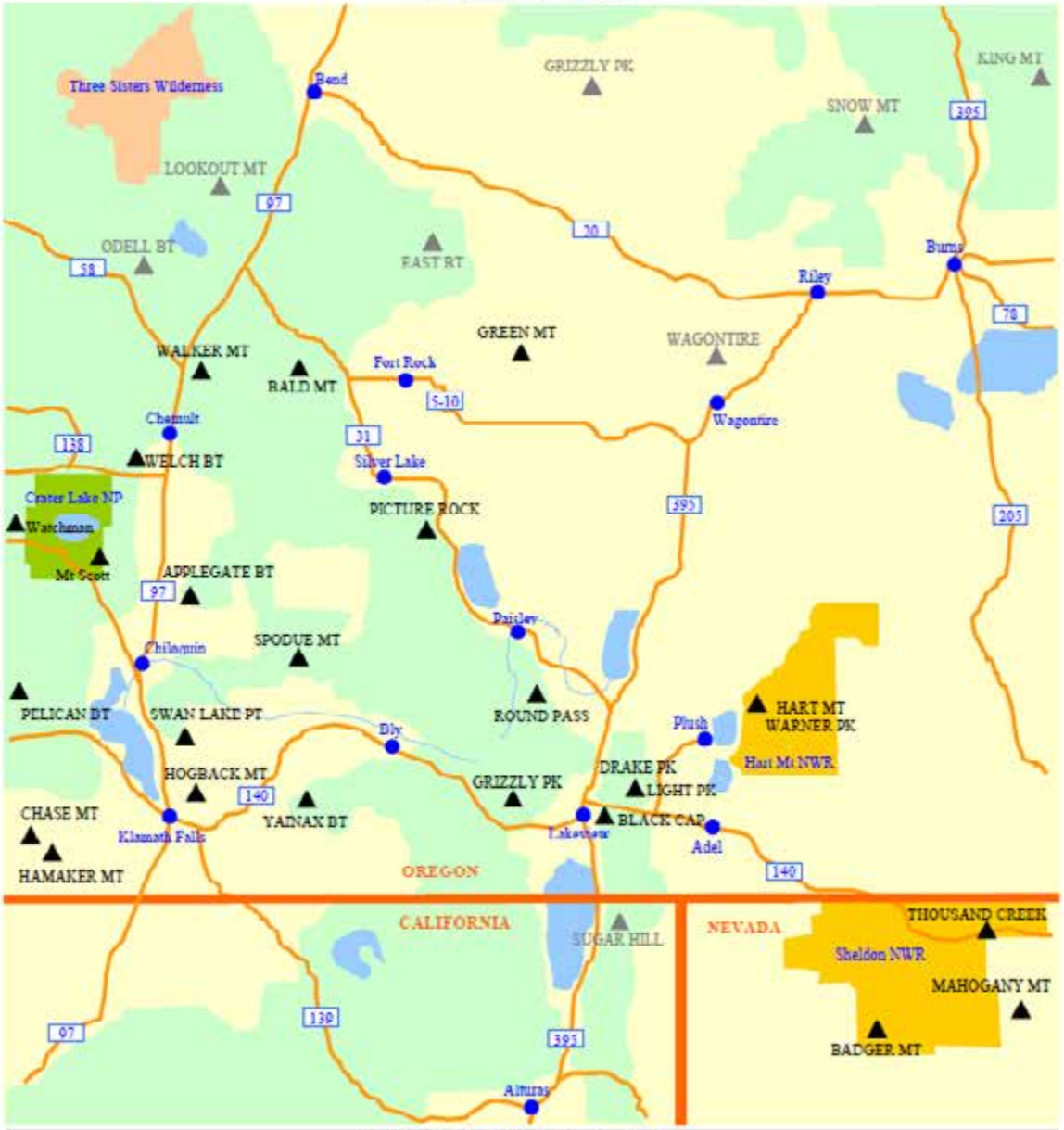
* Blue Highlighted Boxes transmit and receive over a repeater.

Dispatch Phone List

Contact List (unless noted otherwise, all numbers are area code 541)

Name	Location	Work Phone	Name	Location	Work Phone
LIFC Dispatch	Lakeview	947-6315	Klamath Basin NWRC	Tulelake	(530)-667-2231
Bly R.D.	Bly	353-2427	Sheldon/Hart NWR	Lakeview	947-3315
Lakeview R.D.	Lakeview	947-6300	ODF Lake	Lakeview	947-3311
Paisley R.D.	Paisley	943-3114	ODF Klamath	Klamath	883-5681
Silver Lake R.D.	Silver Lake	576-2107	Fire Cache	Lakeview	947-6172
Chemult R.D.	Chemult	365-7001	Helibase	Lakeview	947-6183
Chiloquin R.D.	Chiloquin	783-4001	SEAT Base office	Lakeview	947-6190
Klamath R.D.	Klamath Falls	885-3400	SEAT Base cell	Lakeview	219-0779
Crater Lake NP	Crater Lake	594-3061	Tanker Base office	Klamath	883-6853
KFRA BLM	Klamath Falls	883-6916	Tanker Base Mgr	Klamath	883-6855
LAD BLM	Lakeview	947-2177			
Lakeview G.S.	Lakeview	947-6174	Medford Weather	Medford	776-4332
Fort Rock G.S.	Fort Rock	576-2220			
Gerber G.S.	Gerber	545-6746			

South-Central Oregon Fire Management Partnership
Repeater Sites



▲ LIFC Dispatch Radio Control:

Winema:	Walker Mt	ODF:	Welch Butte	Fremont:	Bald Mt	BLM:	FWS:	ODF:
	Applegate Butte		Hamaker Mt		Picture Rock	Direct	Light Peak	Direct
	Pelican Butte		Yainax Butte		Spodue Mt	Hart Mt	Warner Peak	Black Cap
	Swan Lake Point		Direct(Hogback Mt)		Grizzly Peak	Yainax Butte	Thousand Creek	Round Pass
	Hogback Mt		Crater Lk Watchman		Round Pass	Green Mt	Badger Mt	Yainax Bt
	Chase Mt		Crater Lk Mt Scott		Drake Peak	Hamaker Mt	Mahogany Mt	

Breeding Zone Designation Flagging Color Plan

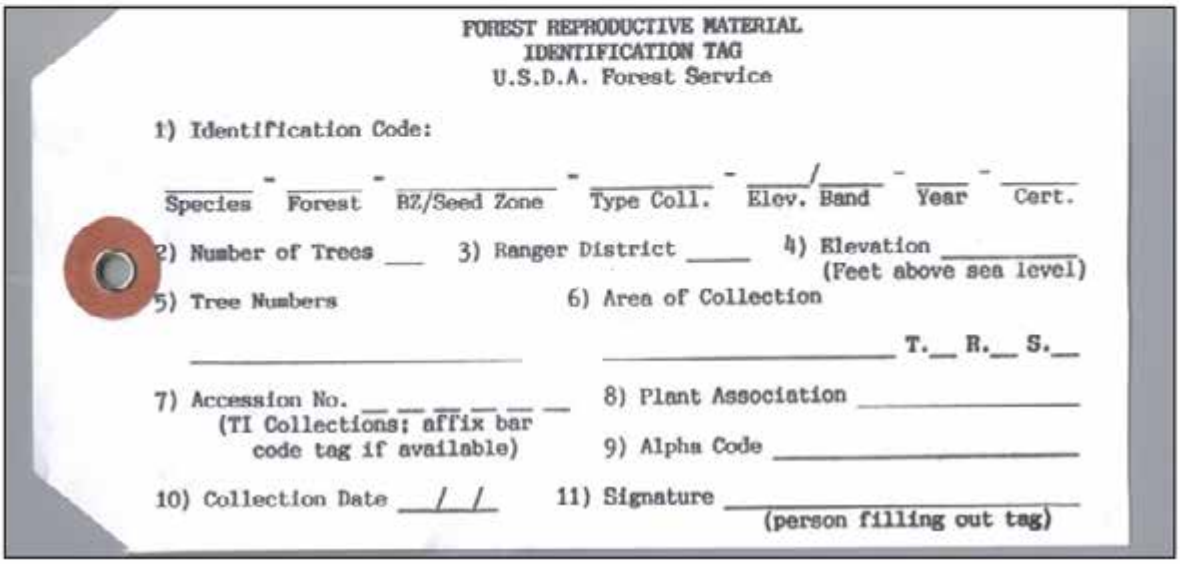
Breeding Zone	Flagging Color for Bushel Bag
02030	Solid Blue
02031	Solid Green
02032	blank
02021	Solid Lime Glo
02022	Black/White Stripe
02011	Solid Orange
02012	Solid Pink Glo
02050	Solid White
02051	Solid Yellow
20031	Blue/White Stripe
20061	Pink/Black Stripe
20062	White with Blue Polka-dots
20063	Blue/Black Stripe
Horseshoe SO	Yellow/White Stripe

Cone Bushel Bag Tags Labeling Plan

Each bag will have two tags:

- one inside the bag
- one attached to the outside

Example collection tag:



FOREST REPRODUCTIVE MATERIAL
IDENTIFICATION TAG
U.S.D.A. Forest Service

1) Identification Code:

_____ - _____ - _____ - _____ - _____/_____ - _____ - _____
Species Forest RZ/Seed Zone Type Coll. Elev. Band Year Cert.

2) Number of Trees ___ 3) Ranger District _____ 4) Elevation _____
(Feet above sea level)

5) Tree Numbers

_____

6) Area of Collection

_____ T.__ R.__ S.__

7) Accession No. __ __ __ __ __ __
(TI Collections: affix bar code tag if available)

8) Plant Association _____

9) Alpha Code _____

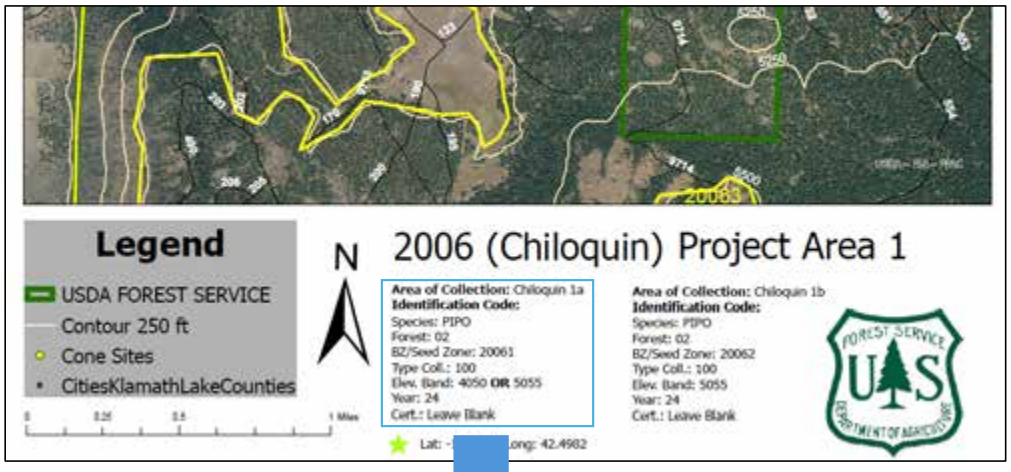
10) Collection Date __/__/__

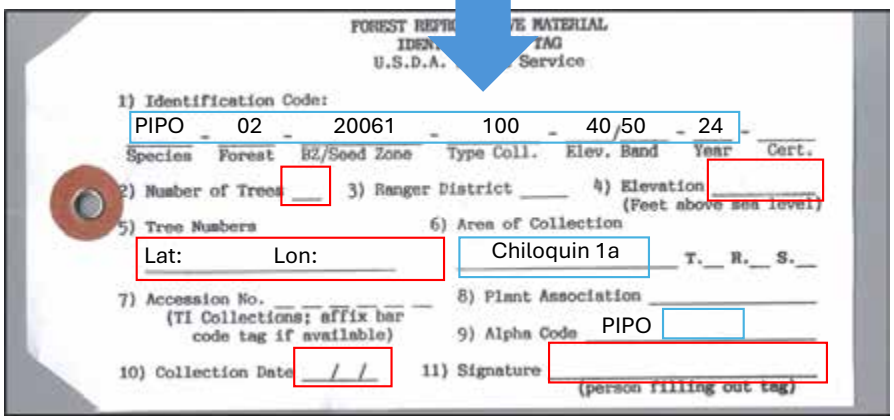
11) Signature _____
(person filling out tag)

Tag inside of bag will also be placed in a protective Ziplock bag.

Procedure for Filling out Collection Tags

Step 1) Using the collection area maps (see example below), identify which collection area and corresponding breeding zone you are in. *NOTE* you can double check which breeding zone you are in by identifying what elevation you are at, and then comparing that to the elevation band information in the map legend. For example, if you are at 4100 ft within Chiloquin project area 1, you would be in **Chiloquin 1a** (**breeding zone 20061**) which has an elevation range of 4000-5000 ft. In this case, you would use the info highlighted in the BLUE SQUARE in the map below to fill in the tag.



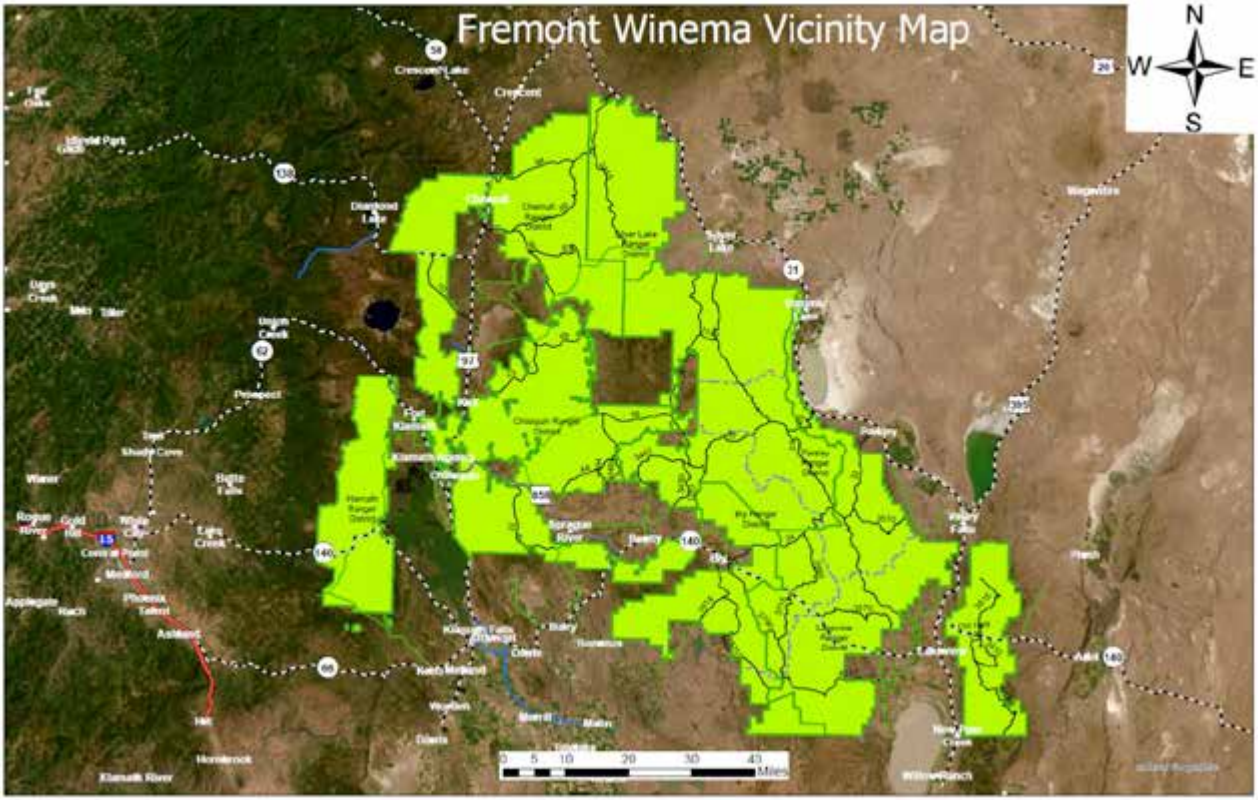


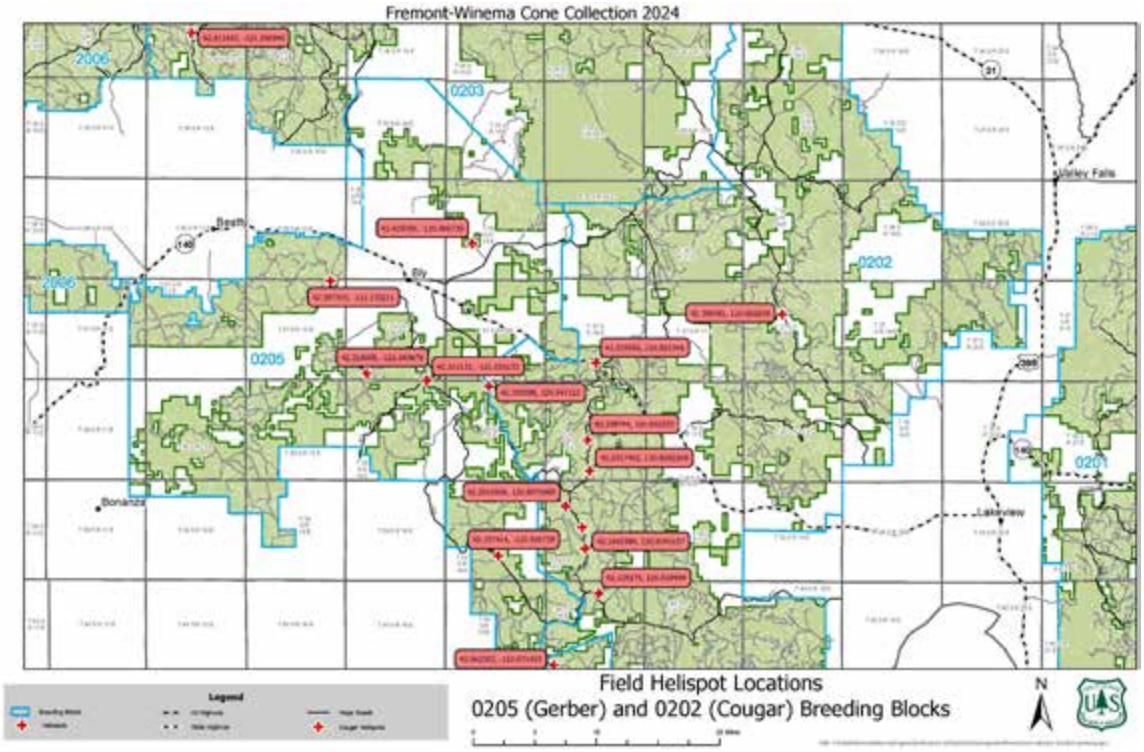
Step 2) Once you have verified which collection area – and corresponding breeding zone – you are in, copy the information from the map for that collection area onto the corresponding fields of the tag (see example tag above where the information for collection area Chiloquin 1a from the map highlighted in the BLUE SQUARE is copied over to the tag). *Note* the Alpha Code is just the species code, which will be PIPO for ponderosa pine.

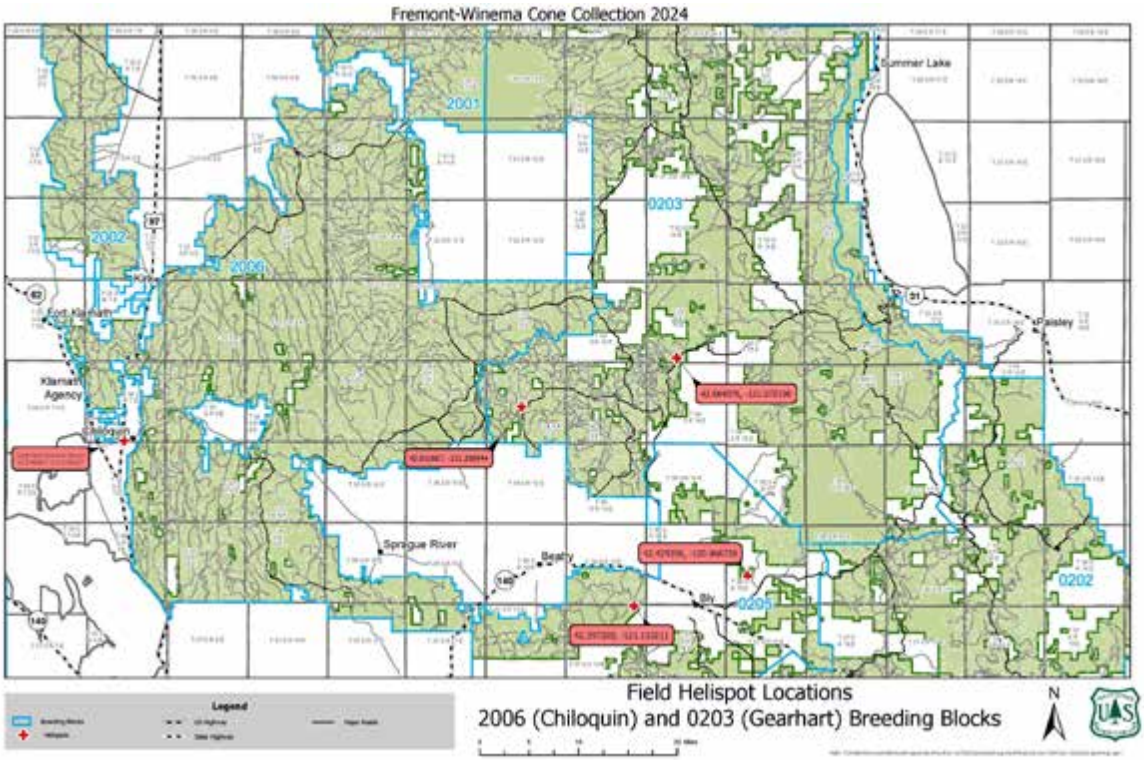
Step 3) Fill in the remaining information on the tag (highlighted in RED SQUARES in the example tag above) based on the specific details of the collection. Below is a description of each of these fields and what to write in them.

- **Number of Trees**: the number of trees collected from in the bag
- **Elevation**: the specific elevation you are collecting at
- **Tree Numbers**: write the GPS coordinates of the stand of trees you are collecting from in this field – if you're collecting from a group of trees from the same stand you can use the same GPS coordinates for the whole group
- **Collection Date**: the date of collection
- **Signature**: the person filling out the tag will sign here
- You do **NOT** need to write anything in the Cert., Accession No., T. R. S., or Plant Association fields. You can leave these fields blank.

Forest Vicinity Map




Fremont-Winema Cone Collection 2024
2006
0203
0202
0205
Bonanza
Bly
Beatty
Valley Falls
Lakeview
Legend
Field Helispot Locations
0205 (Gerber) and 0202 (Cougar) Breeding Blocks
N


Fremont-Winema Cone Collection 2024
2001
2002
2006
0203
0202
0205
Summer Lake
Fort Klamath
Klamath Agency
Chiloquin
Sprague River
Beatty
Bly
Paisley
Legend
Field Helispot Locations
2006 (Chiloquin) and 0203 (Gearhart) Breeding Blocks
N

Medical Facilities List

7. Hospitals							
Name	Address	Travel Time Air/ Ground		Phone	Helipad	Burn Center	Trauma Center
Sky Lakes Medical Center	2865 Daggett Ave Klamath Falls, OR N42° 15.16' x W121° 47.17'			541-882-6311	Yes	No	Yes Lev. III
Lake District Hospital	700 South J St Lakeview, OR N42° 10.86' x W120° 21.07'			541-947-2114	Yes	No	Yes Lev. V
St. Charles Medical Center	2500 NE Neff Rd Bend, OR N44° 04.10' x W121° 16.03'			541-382-4321	Yes	No	Yes Lev. II
Rogue Valley Medical Center	2825 East Barnett Rd Medford, OR N42° 19.08' x W122° 49.90'			541-789-7000	Yes	No	Yes Lev. II
Providence Medford Medical Center	1111 Crater Lake Ave Medford, OR N42° 20.33' x W122° 51.77'			541-732-5000	Yes	No	Yes Lev. II
Legacy Emanuel Hospital & Health Center: Burn Center	2801 N Gantenbein Ave Portland, OR N45° 32.59' x W122°40.21'			503-413-4232	Yes	Yes	Yes Lev. I
UC Davis Regional Burn Center	2315 Stockton Blvd Sacramento, CA N38° 33.17' x W121°27.05'			916-734-5669	Yes	Yes	Yes Lev. I
Oregon Health & Science University	3181 SW Sam Jackson Park Rd Portland, OR 97239 N45° 29.84' x W122° 40.97'			503-494-8311	Yes	No	Yes Lev. I
Renown Regional Medical Center	1155 Mill St Reno, NV 89502 N39° 31.58' x W119° 47.76'			775-982-4100	Yes	No	Yes Lev. II
Humboldt General Hospital	118 E Haskell St Winnemucca, NV 89445 N40° 58.24' x W117°43.57'			775-623-5222	Yes	No	No
8. Medical Emergency Procedures							
Patient assessment and care is first priority. **Contact: "Lakeview" or "Crater Lake" via radio on the proper radio frequency or Call 911.**				**Injury Reporting Procedures:** **Follow Medical Incident Report** ****On Back Cover****			

Travel Times Across Fremont-Winema N.F.

Lakeview to/from Klamath Falls	1 hour and 45 minutes
Lakeview to/from Chiloquin	1 hour and 37 minutes
Klamath Falls to/from Bly	1 hour and 15 minutes
Lakeview to/from Bly	1 hour
Lakeview to/from Paisley	45 minutes

Medical Incident Report – Page 1 of 2		
FOR A NON-EMERGENCY INCIDENT, WORK THROUGH CHAIN OF COMMAND TO REPORT AND TRANSPORT INJURED PERSONNEL AS NECESSARY. **FOR A MEDICAL EMERGENCY**: IDENTIFY ON-SCENE INCIDENT COMMANDER BY NAME AND POSITION AND ANNOUNCE, "MEDICAL EMERGENCY" TO INITIATE RESPONSE FROM IMT COMMUNICATIONS/DISPATCH.		
Use the following items to communicate situation to communications/dispatch. **1. CONTACT COMMUNICATIONS/DISPATCH: (Verify correct frequency prior to starting report)** *EX: "Communications, DIV Alpha. Stand-by for emergency traffic."* **2. INCIDENT STATUS: Provide incident summary (including number of patients) and command structure.** *EX: "Communications, I have a RED priority patient, unconscious, struck by a falling tree. Requesting air ambulance to Forest Road 1 at (lat./long). This will be the Trout Meadow Medical, IC is TFLD Jones, EMT Smith is providing medical care."*		
Severity of Emergency & Transport Priority	□ **RED/Priority 1 – Life or limb threatening injury or illness. Evacuation need is IMMEDIATE** *Ex: Unconscious, difficulty breathing, bleeding severely, 2°-3° burns more than 4 palm sizes, heat stroke, disoriented* □ **YELLOW/Priority 2 - Serious Injury or illness. Evacuation may be DELAYED if necessary** *Ex: Significant trauma, unable to walk, 2°-3° burns 1-3 palm sizes* □ **GREEN/Priority 3 – Minor injury or illness. Non-emergency transport** *Ex: Sprains, strains, minor heat related illness*	
Nature of Injury or Illness & Mechanism of injury		*Brief Summary of Injury or Illness (Ex: Unconscious, struck by falling tree)*
Transport Request		*Air Ambulance/Short Haul Hoist/Ground Ambulance/Other*
Patient Location		*Descriptive Location and Lat/Long*
Incident Name		*Geographic Name + "Medical" (Ex: "Trout Meadow Medical")*
On-Scene Incident Commander		*Name of on-scene IC of medical incident (Ex: TFLD Jones)*
Patient Care Provider		*Name of on-scene care provider (Ex: EMT Smith)*

Medical Incident Report – Page 2 of 2

3. INITIAL PATIENT ASSESSMENT: *Complete this section for each patient as applicable (start with the most severe patient)*

Patient Assessment: *(See IRPG page 106)*

Treatment:

4. TRANSPORT PLAN:

Evacuation Location (*if different*): Descriptive Location and Lat./Long. Patient's ETA to Evacuation Location.

Helispot/Extrication Site Size and Hazards:

5. ADDITIONAL RESOURCES / EQUIPMENT NEEDS: *Ex: Paramedic/EMT, Crews, Immobilization Devices, AED, Oxygen, Trauma Bag, IV Fluids, Splints, Rope Rescue, Wheeled Litter, HAZMAT, Extrication.*

6. COMMUNICATIONS: Identify State Air/Ground EMS Frequencies and Hospital Contacts as applicable

Function	Channel Name/Number	Receive (RX)	Tone	Transmit (TX)	Tone
COMMAND					
AIR-TO-GROUND					
TACTICAL					

7. CONTINGENCY: *Considerations: If primary options fail, what actions can be implemented in conjunction with primary evacuation method? Be thinking ahead.*

8. ADDITIONAL INFORMATION: *Updates/Changes, etc.*

REMEMBER: **Confirm ETA's of resources ordered. Act according to your level of training.**
Be Alert, Keep Calm, Think Clearly, Act Decisively.

B Daily Collection Log

Date	Partner	COR/ POC	Cooler Stored In	Collection Method	Collection Area	Seed/Breeding Zone	Elevation	Insect Activity?	1st Year Cones?	# Trees Climbed	Avg. Seeds/Cut face	Bushels	notes/comments

Frewin Cone Survey

Surveyor Information

1- Name (First and Last Name, RPF#, etc)*

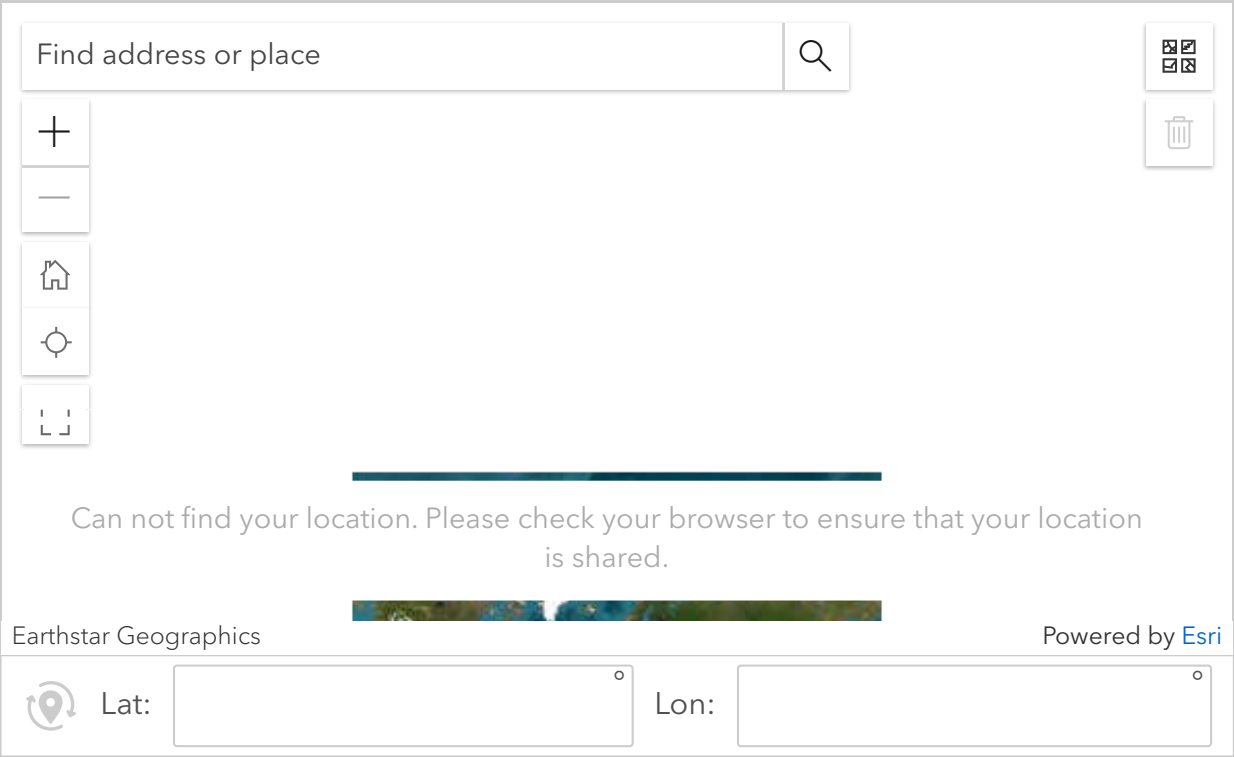
1- Surveyor Affiliation*

- ○ Federal (i.e., USFS, BLM)
- ○ State (i.e., ODF)
- ○ Private (i.e., Industry)
- ○ Non-profit Partner (i.e., Watershed Council, KLFHP)
- ○ Other

Site Information

2- Observation Point*

Survey tool automatically collects your location. If it is inaccurate, please move the cursor to the location of the cone crop.



2- Timestamp*

12/31/2024

11:47 AM

2- Site Aspect*

-Please select-

2- Property Type*

- ○ Public Land
- ○ Private Land
- ○ State Land
- ◉ Unknown

2- Landowner Approval*

Has the landowner approved collection on their land?

- ○ Yes
- ○ No

2- Access

- ☐ Locked Gate
- ☐ Adjacent to Paved Road (~1000')

- [ ] 4WD Required
- [ ] ATV/UTV Required
- [ ] Backcountry (No Vehicle Access)
- [ ] Other

2- Collection Hazards

- [ ] Dense Understory
- [ ] Active Avian Nest
- [ ] Yellowjacket Nest
- [ ] Guard Dogs
- [ ] Steep, Rocky Terrain
- [ ] Other

Tree Observation

This can be useful even if no cones are observed.

3- Observation Scale*

Assessment should performed at a Stand Level (all trees close enough to the surveyor to see cones) except under special circumstances (i.e. rust resistant species, rare seed, etc).

- (●) Stand
- ( ) Individual Tree

3- Tree Species in Stand*

Select all tree species observed in the stand. Choices only include species with verified seed need, so any others will need to be listed under 'Other'.

- [ ] Douglas-fir (PSME)
- [ ] Incense Cedar (CADE27)
- [ ] Ponderosa Pine (PIPO)
- [ ] Sugar Pine (PILA)
- [ ] Western White Pine (PIMO3)

- [ ] White Fir (ABCO)
- [ ] Other

Other Information

Other Photos

(Optional) Photo(s) that may be of interest (i.e., rust-resistant trees, access issues, landmarks). Limit of 3 photos.

1 Drop image here or select image (maximum number of files allowed: 3)

5- Additional Notes

5- Survey for Collection Scouting

Leave as "no" unless specifically part of collection scouting

- ( ) Yes
- (•) No

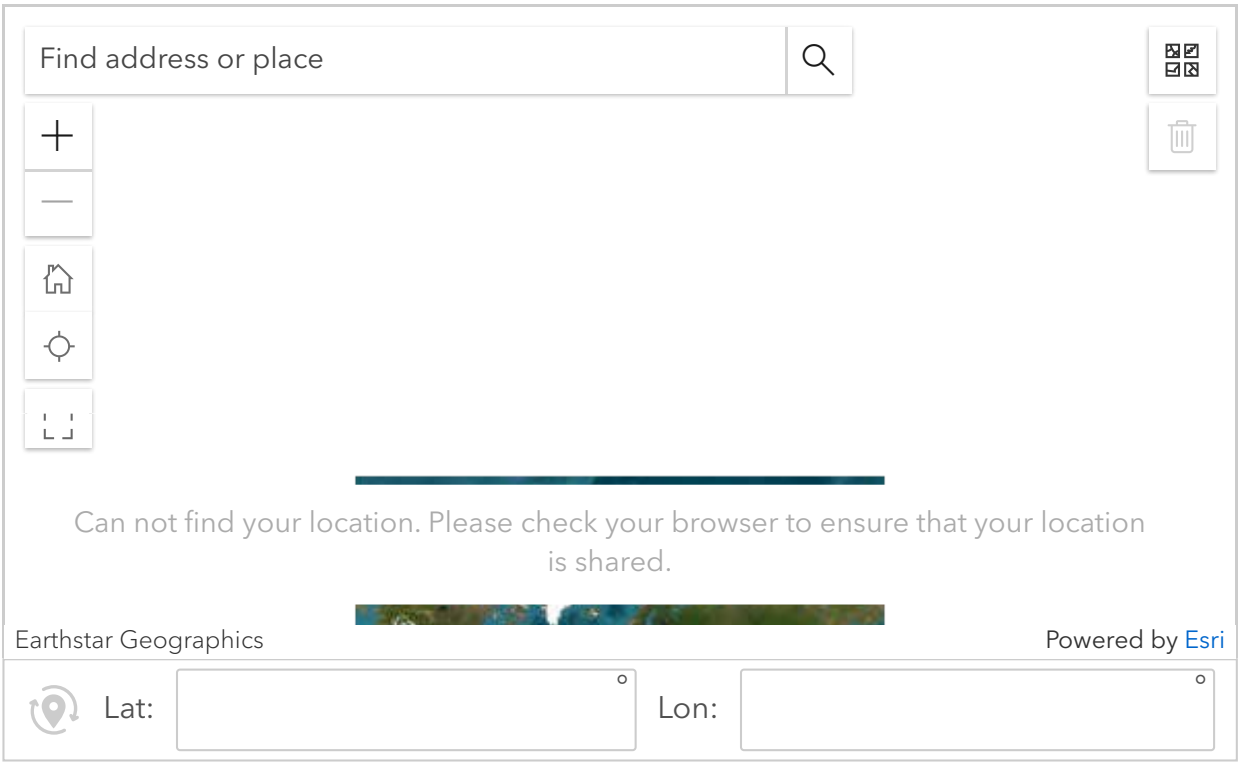
Submit

Powered by ArcGIS Survey123

Site Information

2- Observation Point*

Survey tool automatically collects your location. If it is inaccurate, please move the cursor to the location of the cone crop.



2- Timestamp*

12/31/2024

11:47 AM

2- Site Aspect*

-Please select-

D Cone Collection Workshop

Cone Collection Workshop
Fremont-Winema National Forest

July 31-Aug 1, 2024 **Klamath Falls, OR**

Workshop Objectives:

- To bring together subject matter experts and the USFS personnel and partners who are supporting the 2024 cone collection effort for the Fremont-Winema National Forest.
- To engage attendees in the basics of conifer cone and seed biology and seed maturation and quality assessment.
- To share information and discuss 2024 seed collection priorities and planning areas, collection methods, cone handling, cone bag labeling, and cone storage and transportation protocols.

This workshop will focus on ponderosa pine, the predominant species to be collected this field season.

Workshop Location:

Klamath Falls Ranger District
Large upstairs conference room
Fremont-Winema National Forest
2819 Dahlia Street
Klamath Falls, OR

Workshop Format: The workshop will be i*n-person*, but in a hybrid format to accommodate virtual presenters and participants. Here is the link for those joining virtual: **Join the meeting now**

Field Gear Needed

Day 2 attendees should bring appropriate field safety equipment such as hard hat and boots as well as drinking water and a lunch.

Attendees should also bring (if available to them) binoculars, hand lenses, writing/recording notebooks and implements.

Training Cadre:

Mike Reed Forest Silviculturist,USFS FREWIN NF robert.m.reed@usda.gov; 541-398-5795	**Amy Markus** Cohesive Strategy Coordinator, USFS FREWIN NF amy.markus@usda.gov; 541-9476256
Jamie Kolesar Asst. Forest Silviculturist, USFS FREWIN NF james.kolesar@usda.gov; 541-885-3433	**Chris Martin** Forest Safety Officer, USFS FREWIN NF christopher.j.martin@usda.gov
Bryan Reatini SW OR Zone Geneticist, USFS Region 6 bryan.reatini@usda.gov; 541-530-0523	**Vicky Erickson** Regional Geneticist, USFS PNW Region vicky.erickson@usda.gov; 541-969-7684
Robbie Flowers Regional Entomologist, USFS PNW Region robbie.flowers@usda.gov; 503-319-3180	**Kayla Herriman** National Seed Specialist, USFS Washington Office kayla.herriman@usda.gov; 541-908-4609

Cone Collection Workshop
Fremont-Winema National Forest

July 31-Aug 1, 2024 **Klamath Falls, OR**

Agenda: Wednesday, July 31, 2024

8:30 am	Greetings, Workshop Overview & Kick-off • Welcome • Leader's intent • Partner appreciation	 Mike Ben Goodwin or Wade McMaster Amy
9:00	Introductions	All
9:15	Safety Message	Chris
9:30	Seed and cone procurement cycle	Vicky
9:45	Background: • Forest seed needs & status of 2024 cone crop • Planned collection areas (on- and off-Forest) ○ *use of Survey 123/Avenza results to identify priority collection areas*	 Mike Bryan
10:15	BREAK 15 min	
11:00	Cone crop monitoring & sampling • Assessing seed maturity • Assessing seed quality • Assessing seed quantity	Kayla – overview of monitoring/sampling process & general seed standards Robbie – cone & seed insects
12:00	LUNCH 1 hour	
1:00	Classroom exercise to examine ponderosa pine branches: • Pollen • 1st year cones • 2nd year cones • Insect damage – external signs Cut-face test: • Insect damage to seed • Seed counts per cut face • Embryo development & seed maturity	Kayla, Robbie, & Cadre Kayla/Robbie

2:30	Genetic BMPs • # stands • # trees per stand • Distance between individual trees and stands • Upper 1/3 crown • Assessing parent tree phenotypic quality & safety for climbing	Vicky
3:00	Cone bagging and tagging/labeling • BMPs • Demonstration of 1 bushel cone bagging & volume expansion as cones after ripen • Tag labeling & daily collection log for planned collection areas	Kayla Mike & Kayla Bryan
3:30	Break	
3:45	Cone handling and temporary storage • BMPs • Transport to on-forest or BLM coolers	Kayla Mike/Jamie – specifics of the 2024 collection
4:15	Cone transport and delivery to seed extractories • BMP's • Transport to private extractory • Transport to Bend extractory	Kayla Mike: Collins Pine deliveries Kayla
4:45	What happens to cones after delivery to extractory?	Kayla
5:00	Adjourn for day	

Agenda: Thursday, August 1, 2024		

8:30	Logistics
	• Equipment & checklist overview
	• Key POCs & collection area assignments for different entities:
	  • USFS POCs, CORs/inspectors/support staff
	  • Dorena & other Force Account climbing crews; APHIS?
	  • ODF
	  • American Forests
	  • ACRE
	  • PROPS
		Mike/Jamie

9:00	Safety and Communications Plans	Chris
10:00	Field visit to a collection area(s) to evaluate cone crop and discuss collection plans and timeline	All
3:30	Adjourn	

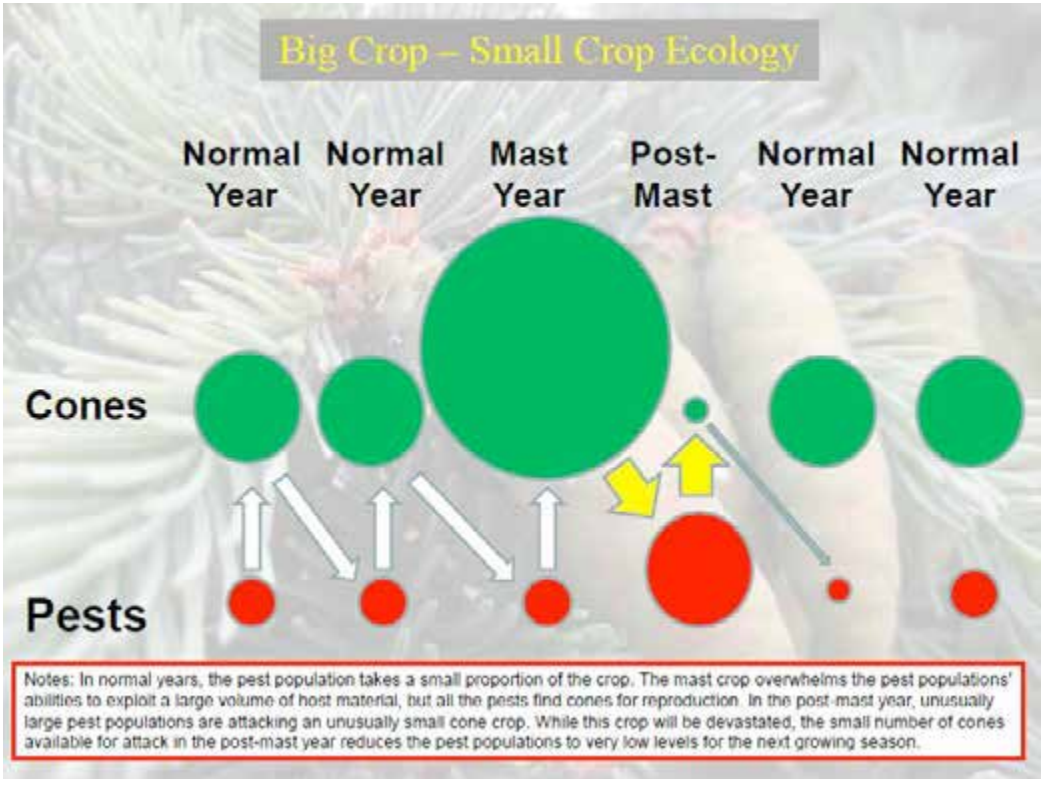
E Cone and Seed Insect Ecology

General Tips for Wild Cone Collection Insect Monitoring

Focus the timing of wild cone collection monitoring for later summer (July-August). Use binoculars during cone surveys to look for exterior damage (dead or dying cones and/or insect frass/webbing). Collect a sample of cones from each tree climbed (mid-crown tends to be most representative of insect damage) and bisect, looking for insect life stages and/or damage levels. Monitor for pests by selecting from cone collections (representative of what you plan to collect) and examining them as above. Mast years and insect pest populations are subject to "big crop-small crop" ecology dynamics (See figure below). Insect pests can severely infest cone crops in the year following a mast year.

Taken from the "big crop-small crop ecology" figure below:

"In normal years, the pest population takes a small portion of the crop. The mast crop overwhelms the pest populations' ability to exploit a large volume of the host material, but all the pests find cones for reproduction. In the post-mast year, unusually large pest populations are attacking an unusually small cone crop. While this crop is devastated, the small number of cones available for attack in the post-mast year reduces the pest populations to very low levels for the next growing season."



USDA Forest Service and American Forests staff with the Collins Pine planting crew

The authors of this document hope that this guide will provide a launching pad for future planning, funding and implementation of large-scale cone collection efforts on other forests!

American Forests