Proceedings of the 67th Western International Forest Disease Work Conference

Held Virtually Online

April 12-14, 2022

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Compiled by

Brent W. Oblinger

USDA Forest Service

Forest Health Protection

Bend, Oregon

Cover photo by USDA Forest Service: Abiotic damage on conifers (2021) following a heat dome in summer of 2021 in the Oregon Coast Range.

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67th Western International Forest Disease Work Conference
Virtual Meeting Agenda

April 12-14th, 2022

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1:10-2:15	***KEYNOTE – Genomic tools for forest pathogen detection and surveillance*** *Richard Hamelin, Department of Forest and Conservation Sciences, University of British Columbia*	*Mee-Sook Kim*
2:15-2:30	***BREAK***	
2:30-3:30	***Dwarf Mistletoe Committee Meeting***	*Dave Shaw*
2:30 – 2:40	*Dwarf mistletoe news- Publication of "Mistletoes of the Continental United States and Canada" by Bob Mathiasen!*	
2:40 – 3:00	*Stephen Calkins: Transformation of western hemlock (Tsuga heterophylla) tree crowns by dwarf mistletoe (Arceuthobium tsugense, Viscaceae)*	
3:00 – 3:20	*Brent Oblinger: Susceptibility of sugar pine and two other conifers to mountain hemlock dwarf mistletoe in south central Oregon*	
3:20 – 3:30	*Round Robin/Discussion, segue into happy hour*	
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Wednesday, April 13, 2022

Time	*Event*	*Moderator*
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1:35 – 1:45	***Observations from British Columbia – Effects of the 2021 heat dome –*** *Harry Kope, BC Ministry of Forests, Victoria, BC*	
1:45 – 2:00	***Mechanisms of pine disease susceptibility under experimental climate change –*** *Enrico Bonello, Molecular and Chemical Ecology of Trees, Plant Pathology, The Ohio State University*	
2:00 – 2:40	***Leveraging plant physiology and forest ecology to understand the vulnerability of western US forests to climate change –*** *William Anderegg, School of Biological Sciences, University of Utah*	
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2:55-4:05	***PANEL – Climate, Climate Change and Tree Diseases***	*Continued*
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Time	Event	Moderator
3:10 – 3:30	***Coming out of the woodwork: Latent pathogens and climate stress –*** *Matteo Garbelotto, Department of Environmental Science, Policy, & Management, UC Berkeley*	
3:30 – 3:40	***Predicting climate-change influences on an Armillaria root disease pathogen and Douglas-fir –*** *Mee-Sook Kim, US Forest Service, Pacific Northwest Research Station, Corvallis, OR*	
3:40 – 3:55	***Visible scorch symptoms associated with the June 2021 heat dome in Oregon –*** *David Shaw, Oregon State University and Gabriela Ritokova, Oregon Department of Forestry*	
3:55-4:05	***The Plant Disease Triangle is heating up! –*** *Paul Hennon, USFS Pacific Northwest Research Station (retired)*	
4:05	***FAREWELL***	

Thursday, April 14, 2022

Time	Event	Moderator
1:00-2:00	***KEYNOTE – Opportunities to improve forest soil health with biochar*** *Debbie Page-Dumroese, US Forest Service Rocky Mountain Research Station, Moscow, ID*	*Mee-Sook Kim*
2:00-2:15	***BREAK***	
2:15-3:00	***Business Meeting***	*Sarah Navarro*
3:00	***CLOSE AND HAPPY TRAILS***	*Sarah Navarro*

Keynote Address (Moderator: Mee-Sook Kim)

Opportunities to improve forest soil health with biochar

Debbie Page-Dumroese[1]

Many U.S. forests have a long history of fire suppression and have had changes in forest management that resulted in many overstocked stands. To treat these stands, large quantities of unmerchantable materials are removed. These woody residues are often piled and burned which results in smoke and particulate emissions and impacts to the soil resource. Biochar, charcoal made for intentional land applications, can be made from these 'waste' residues that are usually burned in slash piles. Converting biomass to biochar is an opportunity to mitigate climate change, improve forest and soil health, reduce the risk of wildfire, improve a myriad of ecosystem services, and revitalize rural economies. It is useful for restoring or revitalizing degraded forest soils by sequestering carbon, but also useful for greenhouse gas emission reduction, increased water storage and plant available water, reduced runoff, and increased microbial biomass. Forest soils have a large capacity to store carbon and using a biochar amendment greatly enhances this capability. In-woods biochar production could benefit air quality, improve forest health, and help increase soil restoration activities. For example, biochar can be made and used on-site to reduce compaction on log landings and skid trails, restore abandoned mine sites, or keep understory vegetation green longer in the growing season. In-woods biochar production can be accomplished at a variety of scales which range from carefully built slash piles, in kilns of various sizes, or by using air burners. Woody biomass from salvage logging, thinning operations, diseased trees, or invasive woody shrubs are excellent feedstocks for creating biochar and applications rates range up to 22 Mg/ha (10 tons/ac). Biochar applications are usually surface applied, except where there is no intact forest floor. Currently, there is little biochar production from national forests. However, new equipment (e.g., air burners) can increase production rates and overall acceptance of converting slash piles into biochar. In addition, the Bipartisan Infrastructure Law, the Wildfire Strategy, and other policy instruments make biochar production an increasingly favorable alternative to open burning on many forest sites.

[1]*USDA Forest Service, Rocky Mountain Research Station, Moscow, ID*

Panel- Climate, Climate Change and Tree Diseases (Moderator: Alex Woods)

Investigating the extent and possible causes of western redcedar dieback throughout Oregon and Washington

Betsy A. Goodrich[1], Christine Buhl[2], Melissa J. Fischer[3], and Joseph M. Hulbert[4]

Forest health specialists, land managers, and landowners have been observing symptoms of dieback and mortality in western redcedar (WRC, *Thuja plicata*) across the Pacific Northwest since at least 2015. Symptoms included dying tops, thinning or chlorotic crowns, and sudden mortality and were collectively grouped as 'western redcedar dieback' (Figure 1). Secondary insect pests, root pathogens, shallow rooting, and poor site quality were observed at some, but not all, site visits and novel mortality agents were not found. Aerial Detection Surveys in the Pacific Northwest, USA added a WRC dieback code and began mapping polygons with symptomatic trees in 2017. Yearly acreage mapped with WRC dieback symptoms across Washington and Oregon grew from approximately 3,600 acres in 2017 to 10,255 acres in 2018 to between 40,000 and 50,000 acres per year in 2019, 2020, and 2021. Given the apparent widespread dieback symptoms and lack of consistent biotic agents, we hypothesized that dieback was associated with abiotic factors. The main objectives of this work were to: develop a user-friendly survey tool for a multi-agency cooperative network to map the distribution and possible site factors associated with WRC dieback, attempt to determine possible causal agents, and develop a network of established sites for more focused sampling of mortality-causing agents.

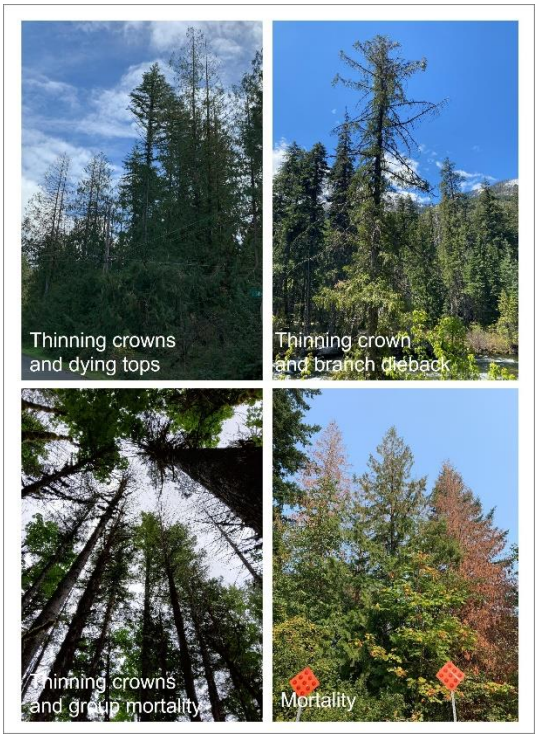

Figure 1. Common symptoms collectively referred to as 'western redcedar dieback' reported across Washington and Oregon.

[1]*USDA Forest Service, Forest Health Protection, Pacific Northwest Region, Wenatchee, WA*

[2]*Oregon Department of Forestry, Salem, OR*

[3]*Washington Department of Natural Resources, Colville, WA*

[4]*Puyallup Research and Extension Center, Washington State University, Puyallup, WA*

Data were collected with two tools associated with mobile data collection. Our multi-agency group developed and tested a set of protocols to collect data at sites where WRC dieback was occurring. We developed a protocol and a survey tool using the Survey123 application. During the survey development process, we collaborated with Washington State University to extend similar survey questions for a citizen science survey using the iNaturalist tool (Hulbert 2022, https://www.inaturalist.org/projects/western-redcedar-dieback-map). For some analyses we combined Survey123 and iNaturalist WRC dieback locations. In addition to location data from all mapped sites, a central symptomatic WRC was tagged as a monitor tree and site data were collected at a subset of Survey123 sites including: aspect, slope position (e.g. valley bottom, toe slope, midslope, etc.), total basal area, basal area of symptomatic WRC, dominant overstory vegetation, dominant understory vegetation, dieback symptom types, severity of crown transparency, and severity of crown dieback. Tree cores were collected at some sites to view recent growth patterns.

Data were compared for site and stand characteristics within and across three ecoregions: eastern Washington (east of the Cascade crest through central and northeastern Washington), western Washington, and western Oregon. We also compared environmental conditions of WRC dieback locations versus distribution locations based on spatial data from Individual Species Parameter Maps (ITSP; Ellenwood et al., 2015) of WRC across Oregon and Washington using 30-year climate normal data from the period 1991-2020 using ClimateNA v7.20 (Wang et al., 2016). We compared temperature, precipitation, and derived variable climate data medians between mapped sites with WRC dieback (hereafter referred to as 'unhealthy' sites) and sites from ITSP WRC distribution ('distribution' sites). To narrow down the list of potential climate variables associated with WRC dieback, we explored climate data with categorical and regression tree (CART) models. We used the classification method to help predict occurrence of sites as either 'unhealthy' or 'distribution'. We ran two separate models, one for westside locations (combining Oregon and western Washington into one model) and one for eastside locations.

A total of 636 sites with WRC dieback were georeferenced across Washington and Oregon by December 2021 (Figure 2). These included 369 sites identified and mapped with Survey123 and 267 iNaturalist observations that met similar WRC dieback criteria as the Survey123 survey. Additional tree and site data were collected at 147 of these sites using Survey123. WRC dieback was observed extensively along the urban corridor from Portland, OR to Olympia, WA and continued north up along the Puget Sound to the Canadian border. In Washington, where the range of WRC also extends into central and northeastern Washington, dieback was also observed across these areas (Figure 2). Sites with WRC dieback were mapped at some locations on the Olympic Peninsula, but this area was not scouted extensively. Small pockets of WRC dieback were observed sporadically in drainages on the slopes of the western Cascades in Washington, but the highest frequency of sites were noted in lower elevations along the urban corridor and along the Puget Sound and associated islands. In western Oregon, WRC dieback was concentrated in the Willamette Valley around the Portland tri-county area (Multnomah, Washington, and Clackamas counties) and in some drainages toward the coast and inland. The WRC range does not extend into central or eastern Oregon (Figure 2).

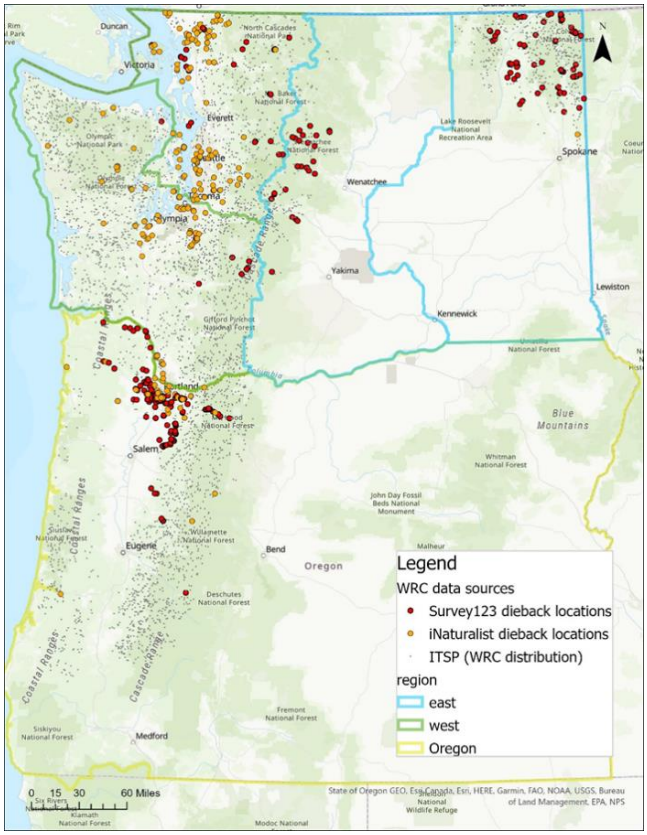

Figure 2. Data sources representing sites with ground-verified WRC dieback (S123 sites and iNaturalist sites) and data source representing WRC distribution (ITSP, Ellenwood et al. 2015) across Oregon and Washington. Regions are defined as western Washington (west), eastern and central Washington (east), and Oregon. Data source for iNaturalist locations: Hulbert 2022.

Crown thinning was the most common symptom observed (n = observed at 122 unhealthy sites mapped using Survey123), followed by branch dieback (n = 62 sites). Western redcedar was the dominant overstory tree species at most unhealthy sites (n = 85 sites) followed by Douglas-fir dominance at 30 sites. No single biotic damage agent was observed frequently across unhealthy sites. While we attempted to choose sites where we did not see active insect or disease activity, heartwood decay was present at many sites. Average basal area (BA) per plot and average BA of symptomatic WRC per plot varied amongst the three ecoregions with average symptomatic WRC ranging from 48 ft^2/ac at western Washington sites to 83 ft^2/ac at eastern Washington sites. Symptomatic WRC BA generally made up 32-52% of total BA.

Unhealthy sites occurred at lower elevations (median of 208 m in elevation) compared with the overall distribution of WRC (median of 586 m in elevation), although these results were most pronounced in Oregon (117 m compared to 664 m) and western Washington (138 m compared to 327 m). Unhealthy sites in Oregon commonly occurred with no slope and were most often found on westerly facing slopes across Washington. Slope position of unhealthy sites varied across ecoregions.

Unhealthy sites generally had lower 30-year median April, May, and June precipitation and higher maximum April - June temperature than the WRC distribution across Oregon/Washington. The westside CART model indicated the climate variables of precipitation as snow from March-May

(PAS_sp), mean warmest month temperature (MWMT), mean seasonal precipitation (MSP), and fall Hogg's climate moisture index from September-November (CMI_at) were the most important predictors of whether a site was classified as unhealthy or as part of the general WRC distribution. Hogg's climate moisture index (CMI) is described as the difference between annual precipitation and potential evapotranspiration (PET) and lower values indicate drier conditions (Hogg et al., 1997). Most unhealthy sites mapped with WRC dieback had spring precipitation as snow threshold below 3 mm, mean warmest month temperature above 19.9 °C, and fall climate moisture index below 15 mm (see Buhl et al., 2022, tinyurl.com/ysnp8asf for more details).

The eastside CART model indicated the climate variables of summer (June-August) Hogg's CMI, extreme minimum temperature over 30 years (EMT), Hargreaves reference evaporation (mm, Eref), and annual precipitation as snow (PAS) as the most important predictors for classifying trees as unhealthy or distribution. The first node to split data in the eastside model was summer (June-August) Hogg's CMI, but approximately half of the unhealthy sites fell to either side of the cutoff threshold of our first predictor variable, therefore we were not as confident in classifying eastside data with explored climate variables. Overall, the eastside model had a higher misclassification rate and did not appear as useful as the westside model when predicting unhealthy sites from the distribution of WRC (Buhl et al., 2022, tinyurl.com/ysnp8asf). We hypothesize that this is related to the wide range of elevation where WRC dieback was mapped across northeastern Washington, and increasing the sample size of mapped locations with dieback across the intermountain region would help clarify site and climate factors associated with WRC dieback in these areas.

Conclusions

- WRC dieback was commonly observed across the Oregon/Washington distribution of WRC, with the exceptions of the Coast Range in Oregon and higher elevations along the Cascades in Oregon and Washington.
- Unhealthy WRC sites had lower median elevation compared to WRC distribution data, especially in westside populations. The frequency of mapped unhealthy sites was highest in low elevation, urban corridors across Washington and Oregon.
- More unhealthy sites were observed on aspects with westerly slopes in Washington and areas with no slope in Oregon and unhealthy sites were not strongly associated with any specific slope position.
- No site factors were associated with higher severity of individual tree crown dieback or transparency.
- The most common symptom of WRC dieback was thinning crowns, followed by branch dieback.
- At unhealthy sites, symptomatic WRC made up approximately 30-50% of the total basal area.
- No biotic damage agent was consistently found associated with WRC dieback across the region.
- Long-term median spring temperatures were higher and median spring precipitation was lower in unhealthy sites compared to the distribution of WRC across Washington and Oregon.

Conclusions Continued-

- In western Washington and Oregon, low spring precipitation as snow was the first chosen predictor variable from a suite of climate variables, and appeared to be a fairly strong predictor variable separating unhealthy sites from distribution sites. We hypothesize this variable is associated with the low elevations where we observed the most dieback.
- In central and eastern Washington, summer climate moisture index was the first chosen predictor variable from a suite of climate variables, but was not a strong predictor variable separating unhealthy sites from distribution sites.
- Collaborations between agency and citizen science data collection efforts provided more thorough data coverage across the PNW, and can be very productive when a forest health problem crosses multiple land ownerships.

Proposed Future Directions

Continue scouting and collecting locations of WRC dieback across areas that were not adequately sampled within the timeline of this project (i.e., Olympic Peninsula, Idaho, British Columbia). Primary Investigators have committed to monitor a subset of Survey123 sites to observe any changes over time or progression of symptoms and mortality. Continue collecting citizen science data using iNaturalist and reconducting analyses with more datapoints. Investigate the role of soilborne forest pathogens associated within site heterogeneity. Utilize a subset of mapped unhealthy sites to investigate site and stand factors associated with WRC dieback within and across sites (e.g. tree physiology, canopy position, microtopography, soil type / texture / drainage, adjacent stream waterflow, water table levels, dendroecology, etc).

Funding and Acknowledgments

This project was funded through USDA Forest Service Forest Health Monitoring Evaluation Monitoring grant (Evaluation Monitoring project WC-EM-20-02). We thank Carl Swanson and Michael Lathrop with ODF for support building the Survey123 tools. Support for engaging the public with the iNaturalist project was provided by a USDA NIFA Postdoctoral Fellowship. We thank everyone who added observations to the Survey123 tool and the iNaturalist dataset.

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Comments on an extreme weather event (heat dome) in British Columbia, 2021

Harry Kope[1]

Global warming is triggering changes to the Earth's climate. A changing climate poses a real threat to most vegetation including forests, in part due to its role in increasing the frequency, duration, and intensity of extreme weather events such as heat waves, floods, and droughts.

Extreme weather events are the primary way that most people notice climate change. The difference between weather and climate is a measure of time. Weather is the condition of the atmosphere over a short period of time. Climate is how the atmosphere "behaves" over relatively long periods of time. In short, climate is the description of the long-term pattern of weather in a particular area.

Between June 25th and July 1st, 2021, unusually warm, dry conditions affected large regions of Western North America. The event marked the hottest June on record in western Canada. Temperature records fell for many weather stations across British Columbia (BC), and Lytton, BC recorded the warmest surface temperatures ever recorded in Canada: 49.6°C (Figure 1).

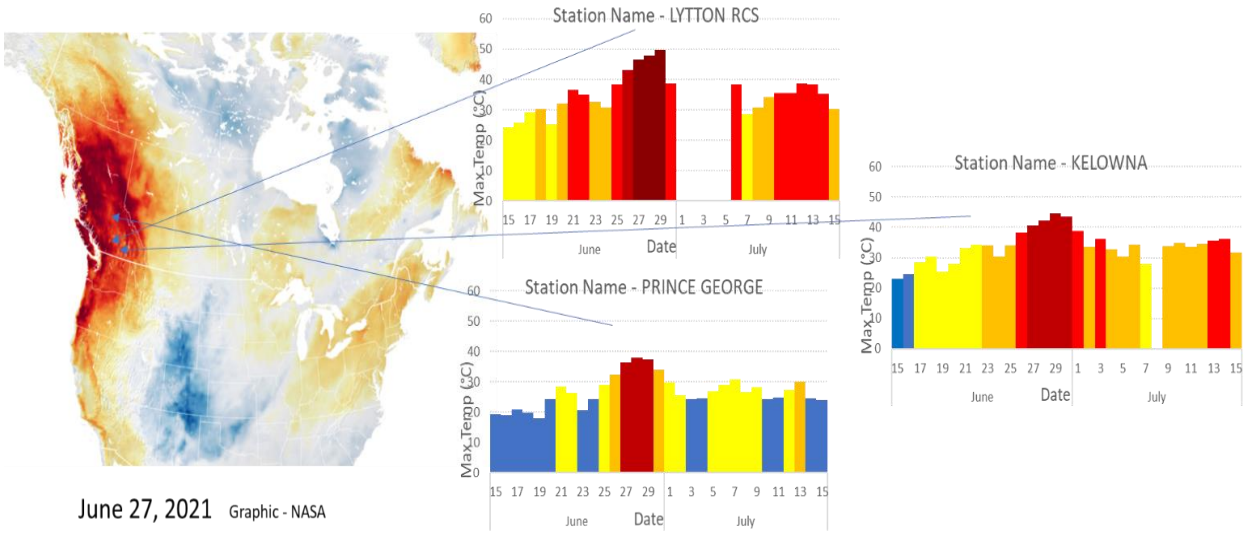

Figure 1. The heat dome – Three weather stations in British Columbia and their temperature readings from the middle of June to the middle of July 2021, including the period of extreme temperatures - 'June 25 to July 1'.

[1]*British Columbia Ministry of Forests, Victoria, BC, Canada*

This extreme heat culminated in a heat dome. Warm air in already dry/droughty areas of western NA were further warmed to temperatures above long-term averages. The warm air mass remained stagnant over western North America with high overnight minimum temperatures, which intensified under a high-pressure ridge. This extreme weather event was far beyond the gradual increase in heat normally experienced in the summer in BC.

The impacts of climate-related extreme weather events such as heat domes or heat waves are likely to continue to intensify in the following decade. Over the next 30 years, Metro Vancouver, Canada, is expected to experience an increase in the severity, duration, and frequency of heat waves due to climate change (Climate change adaptation strategy, 2018). A prolonged extreme temperature event like a heat dome can have multifaceted implications for forest health, including elevated tree mortality, an increase in thermophilic parasites and/or the exacerbation of tree stress (heat stress, drought stress) which enables saprophytic and parasitic fungal diseases.

A question is - Is climate change altering the risk and frequency of these types of extreme events?

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Is black stain root disease contributing to widespread pinyon pine mortality associated with drought and pinyon Ips?

Patrick Bennett[1], John W. Hanna[1], Maria Newcomb[2], Martin Mackenzie[3], Mee-Sook Kim[4], Daram Choi[5], and Jared LeBoldus[5]

Introduction

In recent years, widespread mortality has been occurring across the range of pinyon pines (*Pinus monophylla* and *P. edulis*) in the western U.S. (Meddens et al., 2015; Shriver et al., 2022). In 2019, USFS Forest Health Protection aerial surveyors mapped pinyon mortality occurring across more than 300,000 acres in the Rocky Mountain, Southwestern, and Intermountain Regions (USDA Forest Service 2020a, 2020b). These mortality events generally follow extreme drought conditions and are often attributed to the activity of pinyon ips (*Ips confusus*). Pinyon ips is known to attack trees experiencing stress from drought or disease (Breshears et al., 2005; Floyd et al., 2009; Kearns & Jacobi, 2005; Meddens et al., 2015; Shaw et al., 2005). In many cases, drought appears to be the underlying factor predisposing pinyons to ips attack (Breshears et al., 2005; Meddens et al., 2015). Drought may also inflict hydraulic damage and/or carbon starvation leading to mortality of pinyons even in the absence of pinyon ips activity (Anderegg et al., 2015; Anderegg & Anderegg, 2013; Breshears et al., 2005, 2009, 2018; Meddens et al., 2015). There is also evidence to suggest that ips bark beetles preferentially attack trees infected with *Leptographium wageneri,* a fungus that causes a vascular wilt disease known as black stain root disease (BSRD) (Kearns & Jacobi, 2005). The hyphae of *L. wageneri* interfere with xylem conductance, and thus the symptoms of BSRD are similar to those caused by drought stress. In a study of pinyon mortality in southwestern Colorado, 91% of trees had evidence of both pinyon ips and BSRD, while 8.5% had evidence of BSRD without pinyon ips, and only 0.5% had evidence of pinyon ips without BSRD (Kearns & Jacobi, 2005). That study demonstrated a strong correlation between these disturbance agents in pinyon pine mortality centers and suggests that BSRD may be an underlying factor predisposing pinyons to ips attack.

Leptographium wageneri spreads via root contacts and root grafts (Hessburg & Hansen, 1986), but is also vectored by insects such as scolytids (i.e., bark beetles) and curculionids (i.e., weevils) (Goheen & Cobb, 1978; Witcosky, 1981; Witcosky et al., 1986; Witcosky & Hansen, 1985). For both the Douglas-fir variety (*L. wageneri var. pseudotsugae*) and the ponderosa pine variety (*L. wageneri var. ponderosum*) of the black stain pathogen, root-feeding bark beetles in the genus *Hylastes* are likely the most important vectors, as they are capable of flight and thus are thought to be involved in the establishment of new disease centers (Harrington et al., 1985).

[1]*USDA Forest Service Rocky Mountain Research Station, Moscow, ID*

[2]*USDA Forest Service, Intermountain Region, Forest Health Protection, Ogden, UT*

[3]*USDA Forest Service, Pacific Southwest Region, Forest Health Protection, Sonora, CA*

[4]*USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR*

[5]*Oregon State University, Corvallis, OR*

However, the insect vector hypothesis has never been tested specifically for the pinyon variety (*L. wageneri* var. *wageneri*). To our knowledge, there is only one published study that reports on the identification of insects trapped in pinyon BSRD mortality centers and that study found that three species of *Hylastes* were most common, but they did not confirm that these insects were carrying spores of *L. wageneri* or were capable of transmitting the fungal pathogen (Bishop & Jacobi, 2003).

Based on this information, and our previous observations of BSRD in pinyons, we formulated the following hypotheses: 1) where present, BSRD is an underlying cause of pinyon mortality; 2) when drought is not a primary stressor, pinyon ips preferentially attacks trees infected with *L. wageneri.* Once drought stress reaches a certain threshold such that it becomes the primary stressor, pinyon ips will attack trees regardless of *L. wageneri* infection; 3) pinyons infected with BSRD serve as reservoirs that maintain endemic populations of ips; and 4) *Hylastes* spp. are the primary vectors of *L. wageneri* var. *wageneri* in pinyon woodlands.

To address these hypotheses, we plan to survey pinyon mortality centers across the western U.S., collecting insects and their associated fungi for DNA-based identification. This publication offers preliminary results from our surveys thus far and provides a conceptual model for understanding the role of BSRD in contributing to widespread pinyon mortality, in conjunction with drought and pinyon ips.

Methods

In 2018, samples were collected from several singleleaf pinyon (*P. monophylla*) stands on the San Bernardino National Forest in California where BSRD caused by *L. wageneri* var. *wageneri* had been previously documented (Wagener & Mielke, 1961) (Figure 1). Many of the trees exhibited characteristics that are diagnostic for BSRD including brown or black staining in the sapwood in the roots and root collars of symptomatic trees. All pinyon mortality observed in this area had been attributed to pinyon ips, with no acknowledgement that underlying BSRD may be causing or contributing to mortality. Stained wood samples were collected from these trees and fungi were isolated on a selective medium containing cycloheximide (Harrington, 1981, 1992). Total DNA was extracted from the fungal mycelium at the Center for Genome Research and Biocomputing (CGRB) at Oregon State University, and whole genome sequences were produced on an Illumina Hi-Seq 3000 (Bennett et al. 2021).

In 2021, samples were collected from several pinyon stands in southern Idaho, Utah, Nevada, and California that were exhibiting symptoms of root disease including foliar discoloration and mortality. Mortality centers were observed in several stands at the City of Rocks National Reserve (CIRO) and Castle Rocks State Park in southern Idaho, Great Basin National Park (GBNP) in Nevada, the Sawtooth National Forest in northern Utah, and the Inyo National Forest in California (Figure 1). Samples were also collected at several locations on the Manti-La Sal National Forest in Utah that corresponded to polygons that had been identified during the 2019 USFS FHP Intermountain Region aerial detection survey. These polygons delineated varying levels of mortality in common pinyon (*P. edulis*) that was attributed to pinyon ips. At each location, samples of stained wood were collected from symptomatic trees and fungi were isolated in culture. DNA was extracted from pure fungal cultures and a fragment of the β-tubulin gene was amplified with PCR primers Bt2a and Bt2b (Glass & Donaldson, 1995). The amplicons were then subjected to Sanger sequencing and the resulting sequences were used to search for similar sequences in the National Center for Biotechnology Information (NCBI) basic local alignment search tool (BLAST) database.

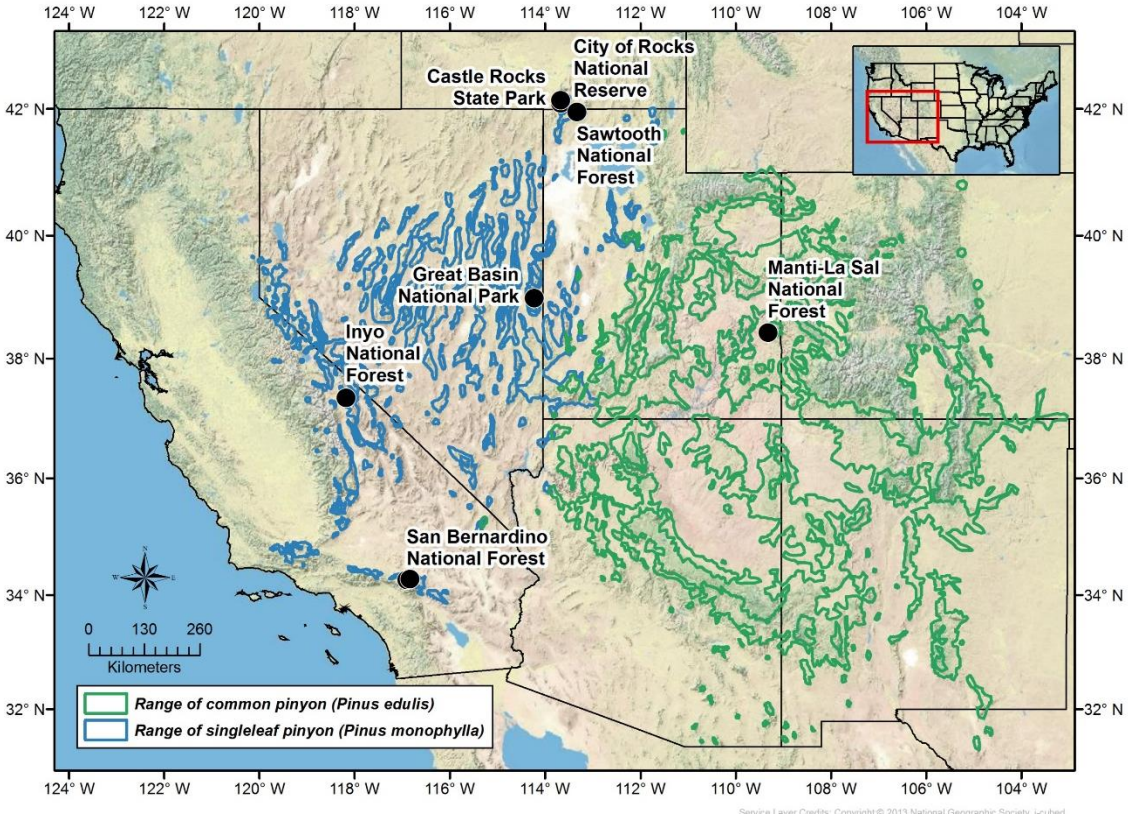

Figure 1. Map of 2018 and 2021 pinyon sampling locations in the southwestern United States with outlines displaying the range of the two native pinyon pine species, *Pinus edulis* and *P. monophylla*.

Results

Varying levels of pinyon mortality were observed across the sampling sites. At some sites, there were distinct disease pockets (Figure 2A), while at others only individual scattered trees were affected. Many trees in these pockets had been attacked by ips and/or red turpentine beetle (*Dendroctonus valens*). Some of the symptomatic trees at each location exhibited diagnostic features of BSRD including black or brown staining in the vascular tissue at the root crown (Figure 2B). In 2021, three isolates identified as *L. wageneri* were recovered, one from *P. monophylla* at CIRO, one from *P. edulis* on the Manti-La Sal National Forest, and one from *P. monophylla* on the Inyo National Forest. Several isolates have been tentatively identified as *L. terebrantis* and *L. longiclavatum*, fungi that are associated with turpentine beetles (both *Dendroctonus valens* and *D. terebrans*) and mountain pine beetle (*D. ponderosae*), respectively. Other fungi isolated from pinyons included *Ophiostoma minus*, *O. ips*, and *Grosmannia aurea*. The samples collected at GBNP in 2021 exhibited dark staining in the vascular tissue but did not yield any fungal isolates when cultured on the selective medium. On a subsequent visit to GBNP, additional samples were collected, and fungal isolates are now being prepared for DNA sequencing to determine their taxonomic identities.

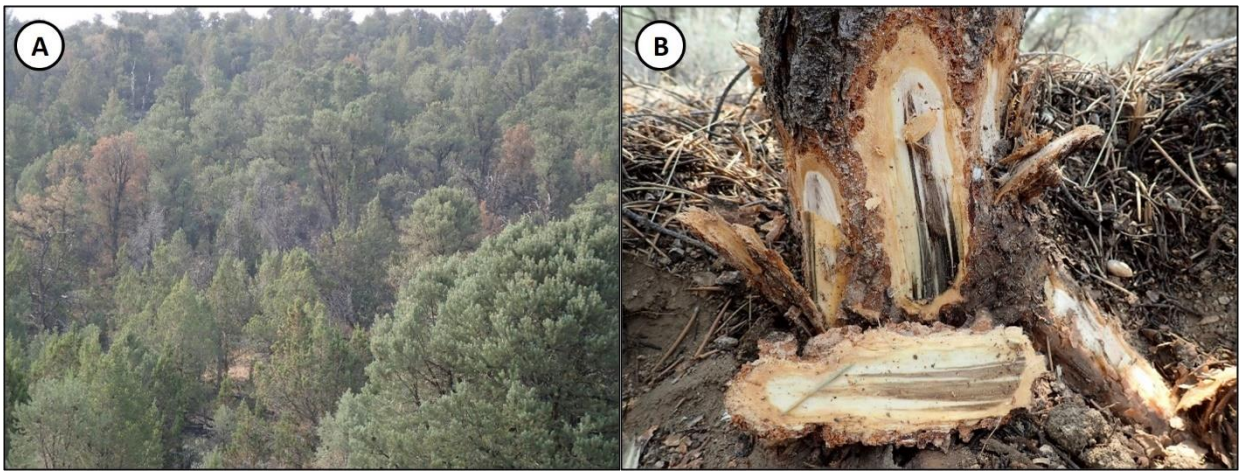

Figure 2. A). Mortality center in a singleleaf pinyon (*Pinus monphylla*) stand at City of Rocks National Reserve in southern Idaho. B). Black staining in the vascular tissue of a singleleaf pinyon (*P. monophylla*) at City of Rocks National Reserve in southern Idaho. The fungus isolated from this stained wood was identified as *Leptographium wageneri* using DNA-based identification.

Conclusions

The observed pinyon mortality was associated with pinyon ips, BSRD, red turpentine beetle, and other agents. The specific roles and relative importance of each of these agents in widespread pinyon mortality events require further investigation, in addition to the roles of drought and other environmental stressors that influence the susceptibility of pinyons to these agents (Figure 3). Drought, pinyon ips, and BSRD are recognized as primary agents of mortality, while other fungi and beetles are likely secondary agents. More work is needed to confirm the identity of the isolates that have been tentatively identified as *L. terebrantis* and *L. longiclavatum*. These fungi have been implicated as pathogens contributing to mortality of loblolly pine (*P. taeda*) (Eckhardt, 2003; Mensah et al., 2021, 2022) and lodgepole pine (*P. contorta*) (Lee et al., 2006), respectively. Further investigation is needed to determine the role(s) of *Leptographium* spp. in widespread pinyon mortality events and to characterize the relationships among these fungi and their beetle vectors. Future efforts will be focused on assessing the extent, severity, and causes of pinyon mortality and describing the interactions among BSRD, other biotic agents, and environmental factors such as increasing temperature and water stress associated with climate change.

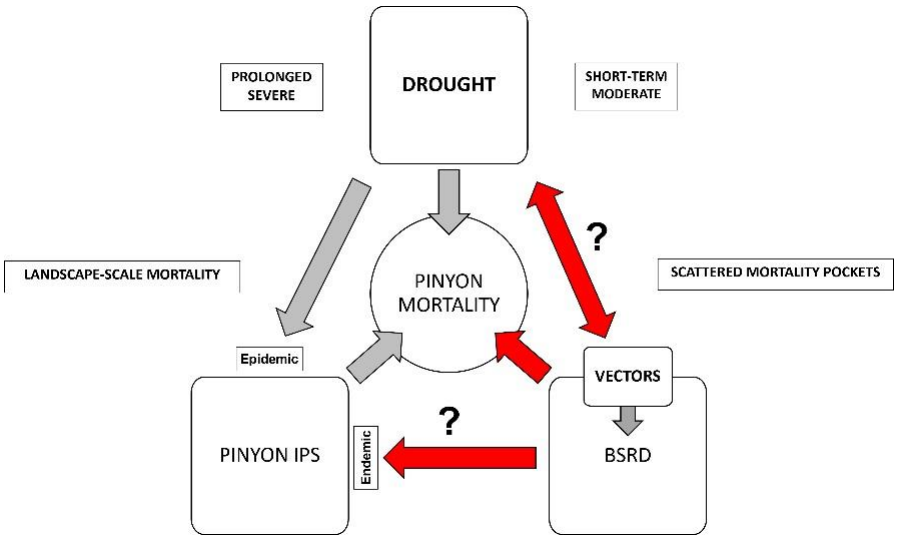

Figure 3. A conceptual model depicting our hypotheses about the relationships between multiple interacting disturbance agents associated with pinyon mortality. In this model, drought, pinyon ips (*Ips confusus*) and black stain root disease (BSRD) caused by *Leptographium wageneri,* each cause pinyon mortality independently. Prolonged, severe drought may trigger an outbreak of pinyon ips resulting in landscape-scale mortality. Moderate drought severity could attract the insect vectors that transmit *L. wageneri*, and trees with BSRD may subsequently be attacked by pinyon ips. This phenomenon might be expected to result in scattered pockets of mortality. Trees with BSRD may then become reservoirs that support pinyon ips populations in their endemic phase. In this figure, the red arrows represent relationships that are understudied and warrant further investigation.

Acknowledgements The authors thank Dave Shaw, Wallace Keck, Gretchen Baker, Angel Saavedra for their assistance with this study. This research was supported by the USDA Forest Service, Rocky Mountain Research Station. The findings and conclusions in this publication are those of the authors and should not be construed to represent any official USDA or U.S. Government determination or policy.

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Predicting climate-change influences on an Armillaria root disease pathogen (*Armillaria solidipes*) and Douglas-fir (*Pseudotsuga menziesii*)

Mee-Sook Kim[1], John W. Hanna[2], Jane E. Stewart[3], Marcus V. Warwell[4], Geral I. McDonald[2], and Ned B. Klopfenstein[2]

Armillaria root disease, which affects diverse woody plants worldwide, is typically caused by native *Armillaria* species. Because different *Armillaria* species can behave as pathogens, beneficial saprophytes, and even potential biological control agents, it is important to accurately identify *Armillaria* species that occur in ecosystems. Furthermore, different *Armillaria* species have different climatic requirements, and the precise location of accurately identified *Armillaria* species is critical to develop bioclimatic models that predict potential distribution of each species. Georeferenced occurrence locations (n = 382) for DNA sequence-confirmed *A. solidipes*, a well-known primary pathogen of many conifer forests in western North America, were used to produce bioclimatic prediction models (maps) of potential current and future distributions using Maximum Entropy algorithms (MaxEnt). MaxEnt works well with limited occurrence points and presence-only data, and the bioclimatic model is based on climate layers with 19 climatic variables that primarily relate to temperature and moisture. Bioclimatic prediction models were also produced for one *A*. *solidipes* host, Douglas-fir (*Pseudotsuga menziesii*), based on 12,000 georeferenced occurrence points that were readily available from the Forest Inventory and Analysis database. The future predictions of both pathogen and host indicated a major change in the suitable climate space (potential distribution) under changing climates over future decades. Under future climate-change scenarios, an increasing likelihood of maladaptation of Douglas-fir within its current range is predicted. In general, the suitable climate space for *A. solidipes* largely reflects that of its host, Douglas-fir, and the suitable climate spaces for both the host and pathogen are predicted to move generally northward and/or to higher elevations under future climate scenarios. Forests play a major role in global carbon sequestration, but Armillaria root disease is already a major cause of reduced productivity and mortality in diverse forest ecosystems, especially in the northwestern USA. Under future climate change, trees will likely become increasingly stressed due to climatic maladaptation. This will likely result in increased damage from Armillaria root disease, which will reduce the forests' capacity for carbon sequestration. One approach to manage Armillaria root disease is to select, regenerate, or plant trees that are adapted to climate change and less susceptible to Armillaria root disease. Predictions of current and future distributions of forest pathogens will help to develop appropriate management and regulatory practices to minimize impacts on forest ecosystems.

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[1]*USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR*

[2]*USDA Forest Service, Rocky Mountain Research Station, Moscow, ID*

[3]*Department of Agriculture Biology, Colorado State University, Fort Collins, CO*

[4]*USDA Forest Service, Southern Region, Atlanta, GA*

Visible scorch symptoms associated with the June 2021 heat dome in Oregon

David Shaw[1], Gabriela Ritokova[2], Danny DePinte[3], and Magdalena Kacprzyk[4]

In late June of 2021 Oregon, and the Pacific Northwest of North America, experienced a heat dome with temperatures exceeding 110°F (43°C) in a wide region. Shortly after the heat dome, we began receiving reports of scorch on trees, especially near the coast in Oregon. The USDA Forest Service and cooperative State aerial detection survey included scorch/heat damage in their annual summer survey in 2021 and documented ~229,000 acres (92,673 ha) of visible scorch in western Oregon and Washington, especially in coastal forests, but not exclusively. We traveled to the field and accessed forest landscapes to examine the scorch and describe impacts to conifer trees. Scorch (Figure 1) was consistently associated with stand edges, and steep south and west facing slopes. Sitka spruce (*Picea sitchensis*), Douglas-fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) were observed with scorch. Scorch symptoms varied and included: 1). only foliage death, especially on exposed upper parts of branches; 2). new growth tip death where the new foliage and stems died and drooped; 3). in western hemlock scorch also included small branch death, of over ~30 cm from the tip; 4). in Douglas-fir, a unique signature of the one-, two-year and older foliage death, but not current year foliage; and 5). in western red cedar, the tips of branchlets were consistently killed with foliage. These observations are anecdotal, and we don't know what the long-term impacts will be. It does not appear that large trees died, but in plantations, small western hemlock, western red cedar, and Douglas-fir experience mortality.

Figure 1. Douglas-fir and western hemlock with scorch symptoms in a plantation inland from Seaside, Oregon.

[1]*Oregon State University, Corvallis, OR*

[2]*Oregon Department of Forestry, Salem, OR*

[3]*USDA Forest Service, Forest Health Protection, Pacific Northwest Region, Redmond, OR*

[4]*Agriculture University, Krakow, Poland*

The Plant Disease Triangle is heating up!

Paul Hennon[1]

This short presentation highlighted two papers (Hennon et al., 2020; Hennon et al., 2021) co-authored by a dozen WIFDWC forest pathologists. These publications were the culmination of annual conversations at the Climate Change Committee meetings since 2008 and are intended to advance discussions at future meetings.

The first paper, "A framework to evaluate climate effects on forest tree diseases", describes a conceptual basis for considering climate involvement in forest tree diseases. Based on a modification of the plant disease triangle (Figure 1), we distinguish between two main climate effects that induce disease: 1) how climate favors a pathogen's growth, reproduction, and infection; or, 2) how climate causes direct physiological stress and death to a tree (with or without significant involvement of secondary organisms). A second goal of this paper is to develop a process to methodically document roles of climate in disease, if any. We propose a foundation that organizes climate and related factors to guide pathologists and other forest scientists to determine climate's contribution to disease expression. This foundation was presented in both graphic form and a checklist of factors, which includes spatial and temporal relationships between climate and disease, each addressed at several scales. Assertions of certainty of climate involvement are evaluated by existing criteria of consistency, coherence, plausibility, and experimentation.

The second paper tested the concepts and foundation using seven diseases - including rusts, needle casts, mistletoes and abiotic diseases - for which published information was available. A climate-disease hypothesis is stated for each disease, and then supporting evidence is given by exploring each of the foundation factors. Information gaps were exposed suggesting future research and monitoring. For many of the diseases, the primary management implications are to foster the tree species in areas of low climate vulnerability and to select alternative tree species in areas of climate stress. The material gathered for each disease could be used to assemble a highly tailored climate-disease risk factor model using specific inputs of weather/climate factors identified as driving disease, as well as inputs of tree and pathogen condition and site predisposing factors that modify climate effects. We recommend continually probing the climate-disease hypothesis with new data and revising the climate-disease risk model accordingly. These climate-disease risk models forecast future risk of disease by using climate projections and are a useful basis for local and regional forest conservation and management strategies of vulnerable tree species.

Acknowledgements

I wish to recognize my co-authors listed below for sharing their ideas and knowledge, engagement in thoughtful discussions, and for tolerating frequent pestering to adhere to these new concepts. Our many discussions of specific challenges were one of the most fruitful aspects of this project. I want to give special thanks to Susan Frankel for co-leading this project and for her constant attention to a smooth flow of ideas and clear writing.

[1]*US Forest Service, PNW Research Station, Juneau, AK, retired*

Figure 1. The climate-plant-disease triangle pizza.

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WIFDWC Committee Reports

Climate Change Committee (2020)

Committee Chairs: Susan Frankel, David Shaw, and Alex Woods

Meeting organizers: Paul Hennon, Susan Frankel, Alex Woods, Terry Shaw and Danny Norlander

The committee met virtually as the in person WIFDWC in 2020 was cancelled due to the COVID-19 pandemic. The committee meeting took place on May 14, 2020, from 1:00 to 2:30 pm PST, via Zoom.

Climate and Forest Diseases, 2020 Climate Change Committee Meeting Notes

There were 65 attendees.

Moderator: Alex Woods, BC Ministry of Forests

Paul Hennon presented "Classifying and Documenting Climate Drivers of Forest Tree Diseases". The content of the talk is similar to the draft paper (shared manuscript draft).

Poll results – 84% of respondents would like to contribute to the paper and no respondents thought the framework was useless.

Discussion:

Paul Zambino – Seeing several stands with what matches the pattern for pole blight, associated with drought and poor soils.

Alex Woods – Noticing birch decline – paper birch at the southern edge of its range.

Phil Cannon – Weather patterns in the Pacific are changing and causing many changes in tree disease development. Areas are getting twice normal rainfall and more (29) typhoons. Observed changes in intensity of myrtle rust, *Phellinus noxius* and rapid ohia decline (ROD). Typhoon (hurricane) damage is creating infection courts for *Ceratocystis* – 2 species (cause of ROD).

Ashley Hawkins – Is on the lookout in northern CA, for *Phytophthora* problems tied to moist conditions with warmer temperatures – sudden oak death but also *P. cinnamomi* and *P. lateralis*.

Dave Shaw – Sees value in separating temperature and moisture when looking at disease drivers but also looking at their interaction.

Jim Worrall – Wondering whether types 2a and 2b in the paper should be merged. Sudden aspen decline needs to be moved to 2b which notes that secondary biotic agents are contributing to tree mortality. Worrall noted that secondary "pests" are always biologically important so consider dropping 2a.

Enrico Bonello – Would be happier with a more ecological model for tree disease development that focused on an integration of phenotype, microbiome, climate, etc. These are always working simultaneously, and the complexity needs to be captured in any framework or model of tree mortality. Artificial intelligence and big data may be able to identify signals (drivers) that would be missed otherwise.

Richard Cobb stressed that pathologists need to think like, and work with, ecologists.

Tod Ramsfield – Sees value in mechanistic models for disease development that can be used to inform other modelling efforts and to help with communication to policy-makers.

Jim B. – At the next WIFDWC, would like to present work on Diplodia, drought & temperature. Also seeing lots of Armillaria.

Paul Zambino – Problem that drought duration and periodicity data are not available. Very concerned for trees since drought is the current and future trend in the West.

Terry Shaw – Direct effects of rising CO_2 levels will affect tree growth and survival and also fungi. Also synchronicity between pathogen and plant lifecycles is important.

Alex Woods and others expressed the importance of collecting data, e.g., root disease data, to help inform analysis of permanent plots. Difficult to tease out pathogen effects without data.

Marcus Warwell – Stressed that common garden and provenance trials are key to understanding plant health.

Dave Shaw – Agreed with Marcus and explained that reciprocal plantings are key. Seed source has been the most important factor in foliar disease development. Shaw is working with Mee-Sook Kim, Skylan and ecologist Dave Bell on historic plots in Westside WA and OR, 110 yrs of data. Trying to add root disease data – laminated root disease on Douglas fir.

Alex Woods mentioned that while data may be scarce need to work with what we have and not conclude we just don't have enough data. This can be tricky.

Danny Norlander – Working with FIA data is frustrating since dead trees are often noted as dead from unknown cause.

Loir Winton – Working on aspen running canker. Important for pathologists to partner with ecologists and modelers to generate robust analyses that no person do alone.

Naomie Herpin-Saunier, naomie.herpinsaunier@gmail.com, introduced herself: she is a graduate student at Université Laval, studying forest sciences, and particularly the Swiss needle cast (SNC) epidemic in BC, Canada. She works under the supervision of Richard Hamelin (University of British Columbia, CFS) and Kishan Sambaraju (Univeristé Laval, CFS), but also collaborates closely with Stefan Zeglen and Harry Kope, both BC provincial forest pathologists. She is modelling the current and future severity risk of the Swiss Needle Cast pathogen to develop maps of the disease in difference climate change scenarios in BC; and developing an online platform that automates the assessment of SNC severity in hopes of reducing the time and cost of gathering this data. She is interested in meeting with others that have worked on SNC.

Charlie Barnes introduced himself to the group. He is a newly hired forest pathologist for the U.S. Forest Service, Forest Health Protection stationed in southern California. He replaced Melody Lardner. Charlie has worked the past many years in Ecuador.

Dwarf Mistletoe Committee

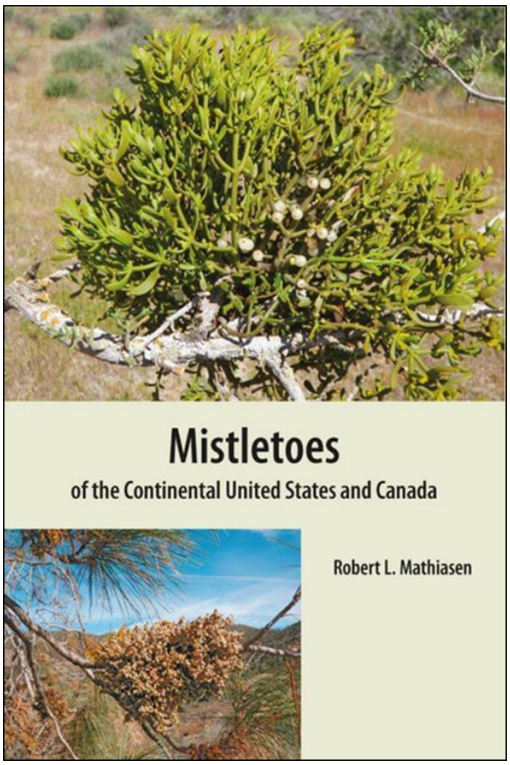
Committee Chair: *David Shaw*

The WIFDWC Dwarf Mistletoe Committee met on April 12, 2022 from 2:30-3:30 pm PST in a virtual format via Teams. A major announcement was the publication of Robert Mathiasen's book*, "Mistletoes of the Continental United States and Canada"!:* *https://shop.brit.org/Mistletoes-of-the-Continental-United-States-and-Canada.* This book makes mistletoe knowledge and identification accessible to all interested people!

We also announced the IUFRO Division 7 meeting in Portugal, Sept 6-9, 2022. Working group 7.02.11, Parasitic flowering plants in forests, will be doing a special oral presentation session, and to be followed by a special issue in the journal *Botany*.

Two talks were presented concerning recently published papers. Talks included: 1-Stephen Calkins: Transformation of western hemlock tree crowns by dwarf mistletoe. 2-Brent Oblinger: Susceptibility of sugar pine and two other conifers to mountain hemlock dwarf mistletoe in south central Oregon.

Publications:



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Oblinger, B. W. (2021). Susceptibility of sugar pine, Shasta red fir and Sierra lodgepole pine to mountain hemlock dwarf mistletoe (*Arceuthobium tsugense* subsp. *mertensianae*, Viscaceae) in south central Oregon. *Forest Pathology*, August, 51(4), e 12693, https://doi.org/10.1111/efp.12693

Other Reports

Business Meeting Minutes, 67th WIFDWC

Secretary: *Brent Oblinger*

The WIFDWC business meeting was called to order by the Conference Chair, Sarah Navarro, at 2:17 PM PST on Thursday, April 14th, 2022. There were 44 people in attendance. An update from the Treasurer was also provided.

Sarah passed the discussion over to Tom Smith and Mary Lou Fairweather for information on the next in person meeting.

Next WIFDWC

Tom Smith presented the meeting location for the next WIFDWC, which will be in Santa Rosa, California on June 5-9 in 2023. This location is in the Sonoma Valley north of San Francisco. Field trip plans are underway to see things including *Phytophthora ramorum* and *P. cinnamomi*, several native pests, drought-related damage, heat and wildfire damage. Other agents to see could include the Mediterranean oak borer complex, *Viscum album* the exotic invasive mistletoe, pitch canker, *Armillaria* spp., *Phaeolus schweinitzii*, *Onnia* spp., and various stem decay fungi. The hotel will be near restaurants and several wine tasting venues in Sonoma Valley Wine Country. It's on the edge of the coastal redwoods zone and not far from the California Coast so they hope to have a field trip stop along the Coast. There are various ways of getting to Santa Rosa via airports such as San Francisco and Oakland in addition to the Charles Schulz Sonoma County Airport right in Santa Rosa (Alaska Airlines). Mary Lou and Chris Lee said they are looking forward to seeing people in person and they were hoping to host it in person this year, but could not due to the uncertainty with the ongoing COVID-19 pandemic still affecting much of the U.S.

Sarah Navarro then thanked the organizing committee over the last two years (Program Chair-Mee-Sook Kim, Secretary-Brent Oblinger, Treasurer-Holly Kearns and Web Designer-Danny Norlander). She also thanked Christy Cleaver and Paul Zambino for planning the Sandpoint arrangements for a meeting that never occurred in 2020 due to the global COVID-19 pandemic.

OLD BUSINESS

The 2019 business meeting minutes are in the proceedings of the 2019 WIFDWC in Estes Park, Colorado. A motion to adopt the WIFDWC 2019 business minutes without revision was made. The motion was seconded and passed.

NEW BUSINESS

Deceased Members

Sarah asked if there were any known deceased members to add in the list of members since the previous WIFDWC in Estes Park, Colorado. Roy Davidson Whitney in Canada passed away on May 19, 2020 at the age of 92. No other deceased members were known.

Future WIFDWC

Sarah Navarro mentioned the next WIFDWC again will be in Santa Rosa, California in 2023. A meeting location has not been determined for 2024, however. U.S. Forest Service Region 1 (Northern) and Region 3 (Southwest) in the U.S., along with Canada, were identified as potential locations for the 2024 WIFDWC, because the meeting has not been in either U.S. Region since at least 2007 and the meeting in 2020 in Sandpoint, Idaho was cancelled in Region 1. Harry Kope proposed a potential location in British Columbia but will be discussing that possibility with colleagues in BC before committing. Nick Wilhelmi and Greg Reynolds offered to host the meeting in Region 3 in 2024 as well. Sarah made a motion to move the 2024 WIFDWC location to the next business meeting and Dave Shaw seconded and it passed.

The Railroad Committee will consist of Dave Shaw and Patrick Bennett to determine a slate of candidates for the 2023 meeting Executive Committee. The 2023 Conference Chair, in addition to a Secretary will be determined, but the 2023 Program Chair will be Brennan Ferguson, Local Arrangements will consist of Chris Lee, Tom Smith and Mary Lou Fairweather, and the Treasurer will be Holly Kearns. Mike McWilliams made a motion for accepting the Railroad Committee and Brent Oblinger seconded the motion for a new Conference Chair and Secretary to be selected and it passed.

Survey and Past Proceedings

A survey form was shared in the meeting chat and would also be distributed in an email after the virtual meeting to see who would like to receive hardcopies of the 2019 WIFDWC proceedings in the mail that attended in Estes Park. There may be options on preferences for a potential meeting this fall in 2022. Sarah Navarro and Brent Oblinger also ask people to update their contact information in the survey form that will be sent out.

Website Update

There was a reminder to send any updates or photos you would like to have highlighted on the webpage to Danny Norlander (Oregon Department of Forestry) who is still managing the WIFDWC website. If anyone has any suggestions on how to improve the website, please also contact Danny.

Treasurers Update

Sarah turned the discussion over to Holly Kearns for the Treasurer's report. Since the last in person meeting in 2019, WIFDWC had spent some money, but it came back after not hosting another in person meeting. We did buy some souvenirs for a meeting that never occurred so those will be handed out sometime and new ones probably will be purchased for the 2023 meeting. We paid to have the 2019 WIFDWC proceedings compiled and printed and paid to host a virtual happy hour space for networking. That leaves us with balances of $10,880 in the meeting account and $1,989 in the Student Travel Award, approximately $8,300 in the hazard tree committee fund so you can go forth with the Western Hazard Tree Conference and $5,750 in the International Travel account fund. So that gives us a total account balance of $26,930. Terry Shaw asked about the amount left in the Student Travel Award fund and if more is needed. If people would like to donate, they can send donations to Holly Kearns to add it to the account. Mike McWilliams seconded the importance of having more donated to the Student Travel Award by sending any donation to Holly, such as a minimum of $25-500. Phil Cannon asked about the International Travel fund and Holly said to get in touch if he wanted to invite people from Mexico, or elsewhere. Robin Mulvey suggested adding the process for sending donations for the Student Travel

Award fund to the WIFDWC webpage and others agreed that would be a great idea. Danny Norlander said to just let him know of those types of things for the webpage.

Committee Updates

Outstanding Achievement Award
The Outstanding Achievement Award Committee is currently comprised of Jane Stewart, Alex Woods and Anna Leon (Chair). The 2019 recipient was Greg Filip and the 2020 recipients were Phil Cannon (who is here in the virtual meeting) and Ned Klopfenstein. Sarah Navarro talked to Anna Leon and all agreed that the 2019 and 2020 recipients should give their acceptance speeches during the 2023 WIFDWC meeting. An email will be sent out for a call for nominations for the next Outstanding Achievement Award and Anna has served on the committee for four years; Alex Woods is happy to serve one more year on the committee. Sarah Navarro mentioned if someone who would like to join the committee, please speak up. Holly Kearns nominated Kristen Chadwick to be new Chair and Alex Woods seconded her nomination and passed. Kristen accepted.

Student Travel Award
Current student travel award committee members include Jared LeBoldus, Kelly Burns and Rachael Sitz. Sarah was wondering if current members will remain on the committee and she will reach out to them to discuss the current seats. Committee members will be discussed at the next business meeting. Donations to Holly Kearns for the student travel fund are always appreciated. An online auction could also be considered to raise money for the Student Travel Award fund.

Other Business

The **Historian Position** should be revisited with Elisa Becker with the Canadian Forest Service as the past historian to see if she retired and inquire about her current status. Harry Kope agreed to contact her and provide an update. She has stepped down as Historian after Harry provided an update in the meeting. The Historian typically holds onto hardcopies of all past Proceedings. Sarah Navarro asked for any volunteers to be the Historian. Brennan Ferguson offered to volunteer and will receive a collection of all past proceedings. Terry Shaw mentioned some other items are held by the Historian and all items held by the Historian should be revisited, such as the Outstanding Achievement Award. Utah State University's library webpage was shared and has links to download all past proceedings and some proceedings are on the WIFDWC webpage.

Robin Mulvey suggested having some type of **online forum** as a discussion board to share and exchange information and suggested that Paul Hennon previously mentioned the idea. He thought when writing a recent paper on climate and diseases, he found it would have been useful and topics during this meeting could be shared on a fully functioning WIFDWC forest pathologists in a forum rather than the countless emails sent and could be educational for all of us. He thought things could be clarified, but the forum may be difficult to host on the WIFDWC website and discussed the possibility of the forestpathology.org website Jim Worrall manages. This could be discussed further at the next business meeting. Another platform may be accessible to everyone no matter what agency and a few options such as Slack Community Forum were mentioned by Hazel Daniels and Robin Mulvey. Sarah mentioned perhaps

another website could be linked to the WIFDWC site and she can follow-up with Paul and Danny about the possibility of creating an online forum.

Concerns over the ability to travel and host/attend in person versus virtual and hybrid meetings were discussed. Terry Shaw expressed concerns about the ability to travel going forward to attend meetings in person, particularly after the COVID-19 pandemic. He asked for US Forest Service members to monitor their ability to attend and travel due to process and raised more concerns since many members are in the US Forest Service. Kristen Chadwick seconded that concern and brought up the discussion about this in 2019 during the business meeting in Estes Park. A letter was proposed to be written in support of attending in person meetings and she noted the importance of in person meetings and it was also discussed before. Sarah Navarro will follow-up to see if the letter was sent and meetings management lists are now part of the US Forest Service process to attend certain meetings. New people involved with meetings management in the regions are now delaying some of the process. Patrick Bennett wanted to respond to Terry's concern and provided a current update on travel during the COVID pandemic for US Forest Service employees and decisions on where meetings may be held according to current COVID-19 transmission rates (low, moderate, high). Kristen mentioned the newer meetings management process and attendance caps before COVID was an issue and for other agencies, the same issue has arisen on attendance limits or travel caps in place. Alex Woods mentioned that virtual platforms do allow for some interactions and meetings for long-distance interactions to share information and WIFDWC planning members could possibly allow for hybrid platforms going forward at WIFDWC with in person and a virtual option. Sarah mentioned others may need to figure out the technology to allow for that logistically and successfully. Robin Mulvey attended a hybrid meeting recently and mentioned people present in the room versus virtually had difficult interactions with virtual attendees not very included in discussions at times. People facilitating hybrid meetings really need to make sure it does not seem like two separate meetings are occurring and to avoid not including the virtual attendees. Robin and Sarah raised concerns about supervisors not allowing people to attend in person at times.

Close

Mee-Sook Kim thanked Sarah Navarro for being Chair of this virtual 2022 WIFDWC and for helping with the meetings planned in the last few years that did not occur due to the global COVID-19 pandemic.

At the close of new business, a motion was made by Sarah Navarro to adjourn the business meeting. The motion was seconded and passed. The business meeting ended by 3:07 PM PST on Thursday, April 14th, 2022.

WIFDWC Outstanding Achievement Award Recipients

Year	Recipient	Meeting	Comments
2000	Lew Roth	Kailua-Kona, HI	For pioneering work on *Phytophthora lateralis,* Armillaria and dwarf mistletoes, and for inspiration and leadership of a generation of plant pathology students and colleagues.
2000	Duncan Morrison		For long-standing contributions to forest pathology research, especially in relation to roots diseases and tree hazards.
2001	Bob Gilbertson	Carmel, CA	For contributions to the taxonomy and identification of wood-inhabiting basidiomycete fungi.
2002	No award given		
2003	Everett Hansen	Grants Pass, OR	For strong leadership in forest pathology including research on the biology and management of tree and seedling diseases of western conifers.
2004	Bob James	San Diego, CA	For strong leadership in forest pathology especially technology transfer and research on the biology and management of forest nursery diseases for growers and nursery pathologists throughout the West.
2005	Walt Thies	Jackson, WY	For sustained long-term high quality research on laminated root rot and other root diseases of forest trees.
2006	Bart van der Kamp	Smithers, BC	In recognition of outstanding lifetime contribution to tree disease research and for inspiring a generation of students and colleagues in the field of forest pathology.
	Alan Kanaskie		For outstanding leadership, as a practicing forest pathologist, in the management of Swiss Needle Cast.
2007	Richard Hunt	Sedona, AZ	In recognition of his valuable research and extension efforts on white pine blister rust, along with many other contributions to forest pathology and biology.
2008	No award given		

Year	Recipient	Meeting	Comments
2009	Bill Jacobi	Durango, CO	In recognition of his 30-plus years as an educator, researcher, organizer, advocate and practitioner of forest pathology.
	Bob Edmonds		In recognition of his 40-plus years as an educator, researcher, organizer, advocate and practitioner of forest pathology and ecology.
2010	Paul Hennon	Valemount, BC	For sustained, significant contributions to our knowledge and understanding of forest disease dynamics and ecology.
2011	Susan Frankel	Leavenworth, WA	For leadership in the science and practice of forest pathology and for critical contributions to the management of Sudden Oak Death.
	Ellen Goheen		For leadership in the science and practice of forest pathology and for critical contributions to the management of Sudden Oak Death.
2012	John Schwandt	Lake Tahoe, CA	For the energy, enthusiasm, and integrity which he has invested in the professions of forest pathology and forest management.
2013	Don Goheen	Waterton Lakes, AB	In honor of your 35 years of dedicated service to forest pathology as a researcher, leader and mentor of others.
2014	Terry Shaw III	Cedar City, UT	In recognition of broad western U.S. and international experiences, and dedicated mentoring and storytelling.
	Willis R. Littke		In recognition of a valuable industry perspective, support for WIFDWC Nursery Committee, international experience, mentoring and storytelling.
2015	Brian Geils	Newport, OR	In recognition of a creative scientist with a broad range of interests, a high level of enthusiasm and curiosity, and a great guy to be with in the field.
2016-2018	No award given		

2019	Greg Filip	Estes Park, CO	In recognition of a lifetime of strong contributions to forest pathology research both internationally and in the western U.S. on root diseases and various other important issues.
2020	Phil Cannon	-	For the major impact to the U.S. Pacific SW and beyond on multiple diseases, mentoring others, being a strong collaborator, and for a high level of energy and enthusiasm.
	Ned Klopfenstein		For major contributions to understand genetic relationships between forest pathogens and *Armillaria*, improve diagnostics, for expertise on multiple diseases, as a mentor to others, and a good-natured character.
2022	No award given		

WIFDWC Outstanding Achievement Award Committee Members

Year	Members		
2000	J. Byler	W. Littke	B. van der Kamp
2001	W. Littke	B. van der Kamp	R. Sturrock
2002	B. van der Kamp	R. Sturrock	G. Filip
2003	R. Sturrock	G. Filip	
2004	G. Filip	D. Goheen	S. Zeglen
2005	D. Goheen	S. Zeglen	D. Shaw
2006	S. Zeglen	D. Shaw	B. Ferguson
2007	D. Shaw	B. Ferguson	R. Reich
2008	B. Ferguson	R. Reich	E. Goheen
2009	R. Reich	E. Goheen	P. Angwin
2010	E. Goheen	P. Angwin	H. Kope
2011	P. Angwin	H. Kope	B. Jacobi
2012	H. Kope	B. Jacobi	P. Hennon
2013	B. Jacobi	P. Hennon	M. Cruickshank
2014	P. Hennon	M. Cruickshank	K. Lewis
2015	M. Cruickshank	K. Lewis	E. Goheen
2016	K. Lewis	E. Goheen	J. LeBoldus
2017	E. Goheen	J. LeBoldus	A. Leon
2019	A. Leon	J. Stewart	A. Woods
2020	A. Leon	J. Stewart	A. Woods

Standing Committees and Chairs, 1994—2022

Committee	Chairperson	Term
Hazard Trees	J. Pronos	1994—2005
	P. Angwin	2006—2015
	K. Chadwick	2016—present
Dwarf Mistletoe	R. Mathiasen	1994—2000
	K. Marshall	2001—2003
	F. Baker	2004—2013
	D. Shaw	2014—present
Root Disease	G. Filip	1994—1995
	E. Michaels Goheen	1996—2005
	B. Ferguson	2006—2009
	M. Cleary	2010—2011
	B. Lockman	2012—present
Rust	J. Schwandt	1994, 2005
	R. Hunt	1995—2004
	H. Kearns	2006—2011
	H. Maffei	2012—2016
	P. Zambino and J. Stewart	2017—present
Disease Control[a]	B. James	1995—2002
Nursery Pathology	B. James	2002—2005
	K. Mallams	2007—2010
	W. Littke	2011—2014
	A. Leon	2015—present
Foliar and Twig Diseases[b]	H. Kope	2007—present
Climate Change[c]	S. Frankel	2007—2008
	S. Frankel & D. Shaw	2009—2014
	S. Frankel, D. Shaw & A. Woods	2015—present

[a]Disease Control committee was disbanded in 2002.

[b]Foliar and Twig Diseases committee was made full charter member in 2009.

[c]Climate Change committee was made full charter member in 2010.

Bylaws of The Western International Forest Disease Work Conference

Passed by a vote of the Membership at the Business Meeting of October 5, 2017.

Article I

Objectives_____

The Western International Forest Disease Work Conference (WIFDWC) was formed in 1953 to provide a forum for information exchange among forest pathologists in western North America. The primary objectives of the organization are:

- To exchange information on forest pests and related matters through periodic meetings and other appropriate means,
- To promote education, research and extension activities in forest pathology, and
- To sustain and improve the health of western North America's forests.

Article 2
Membership_____

Membership is open to individuals who are engaged in forest pathology related endeavors in western North America. These include but are not limited to: research, survey, management, teaching or extension activities pertaining to tree diseases, forest health, or deterioration of forest products.

Western North America is defined as Canada: British Columbia, Yukon, Alberta, Manitoba, Saskatchewan; United States: Washington, Oregon, California, Idaho, Nevada, Utah, Arizona, Montana, Wyoming, Colorado, New Mexico, North Dakota, South Dakota, Nebraska, Kansas, Alaska, Hawaii, Guam, the Commonwealth of the Northern Marianna Islands and other Pacific Islands in Micronesia; and all of Mexico.

Membership is established after attending one Western International Forest Disease Work Conference. Members must attend another Western International Forest Disease Work Conference within 5 years or their membership is no longer valid.

Honorary Life membership will be automatically awarded to those members of WIFDWC (as defined above) who have attended at least 5 previous meetings of WIFDWC and have retired. Newly retired members who meet these criteria should notify the current WIFDWC Secretary of their status. Other members who have retired but do not meet the attendance criteria or other outstanding contributors to the field of Forest Pathology may request, or be proposed for, Honorary Life Membership by members present at an annual business meeting.

A list of Honorary Life Members will be published in the Proceedings of each meeting.

A 50% or more reduction in the registration fees for Honorary Life Members, to include a copy of the Proceedings, should be considered by the Executive Committee, as per Article 7.

Article 3
Officers_____

WIFDWC officers will include a Conference Chairperson, Secretary, Treasurer, Program Chairperson, Historian and Web Coordinator. The Conference Chairperson and Secretary will be elected by majority

vote of the membership at the annual business meeting. If there is no majority, an acting Chairperson will be appointed by the current Conference Chairperson. The tenure of the Conference Chairperson and Secretary begins at the conclusion of the WIFDWC meeting where they were elected and ends when all business from the next WIFDWC is completed. The Treasurer, Historian and Webmaster will be elected every five years, to serve for the following 5 years.

Duties of the Conference Chairperson

At each WIFDWC, the Conference Chairperson will run the general and business meetings. The Conference Chairperson will appoint an interim Program Chairperson at the start of each WIFDWC to gather suggestions and opinions to guide the conference in the planning of next year's conference. The Conference Chairperson will also appoint three members to serve as the "railroad committee" to nominate candidates for next year's Conference Chairperson and Secretary (and every fifth year, Treasurer, Historian and Web Coordinator). The Conference Chairperson may appoint members to assist in conducting the affairs of the Conference including, but not limited, to Local Arrangements representative(s) and Program Chairperson. The Conference Chairperson may also appoint ad hoc committees and their chairpersons as deemed necessary to assist in carrying out the mission of WIFDWC.

In the event that a new Conference Chairperson cannot carry out their duties, the previous Chairperson will carry them out. If another member of the Executive Committee cannot or will not carry out their duties the Conference Chairperson may appoint a replacement.

Duties of the Secretary

The Secretary shall maintain the membership and mailing lists. The Secretary shall send out meeting notices to the membership, take minutes at the business meeting, and compile and distribute the Conference proceedings.

The secretary will query all Honorary Life Members to determine if they want to receive a free copy of the proceedings and only those responding in the affirmative will receive a copy.

Duties of the Treasurer

The Treasurer shall receive all payments, be custodian of WIFDWC funds, keep an account of all moneys received and expended, and make commitments and disbursements authorized by the Conference Chairperson. At the annual business meeting the Treasurer shall make a report covering the financial affairs of WIFDWC. All funds, records and vouchers in the Treasurer's control should be subject to inspection by the Executive Committee.

Duties of the Program Chairperson

The Program Chairperson is appointed by the Conference Chairperson. The Program Chairperson is responsible for all aspects of the conference agenda including arranging the format and timing of the meeting, selecting panel chairpersons or moderators, selecting the poster session coordinator, assigning subject matter committee meeting times, and arranging keynote, contributing paper and other speakers.

Duties of the Historian

The Historian will keep a complete set of WIFDWC proceedings and answer any inquires as needed. The Historian will contact the WIFDWC Secretary and provide the address for mailing the archival copy of the proceedings.

Duties of the Web Coordinator

The Web Coordinator will create and manage the WIFDWC website. The Web Coordinator will supervise the hosting, security and access of the website. Content for the website will be provided by the Executive Committee for each meeting. The Web Coordinator will ensure that previous WIFDWC meeting websites and their proceedings are archived and linked to the current website.

Compensation

Officers will not be compensated for their services.

Non-liability of Officers

The officers shall not be personally liable for the debts, liabilities or other obligations of the WIFDWC.

Article 4
Decision Making Process_____

The business meeting will be run under Roberts Rules of Order. Meetings are open to the public and non-members may participate in meetings. Only members may vote.
Decisions will be made by majority, with each member granted one vote. Votes may be called for at the annual business meeting or via electronic ballot (i.e., e-mail ballot, web poll, etc.). A quorum is reached when more than 25 members are present.

Article 5
Finances_____

Expenditures

The Conference Chairperson may authorize expenditures of WIFDWC funds. Standing Committee Chairs may similarly authorize the expenditure of funds that are generated by their standing committees (e.g., Hazard Trees Committee). Checks, orders for payment, etc. may be signed by the Treasurer, or other person designated by the Chairperson. The Executive Committee may determine which and how many outside speakers they want to invite, and travel costs for such speakers can be paid from registration fees.

Contracts

The Conference Chairperson may authorize any officer or agent of WIFDWC to enter into a contract on behalf of WIFDWC. Standing Committee Chairs may similarly authorize any agent of their standing committee to enter into a contract on behalf of their committee. Unless so authorized, no person shall have any authority to bind WIFDWC or any standing committee to any contract.

Gifts

The Conference Chairperson or the Treasurer may accept on behalf of the WIFDWC any contribution, gift, or bequest. Commercial sponsorship of conference special events is not allowed.

Fiscal year

The WIFDWC fiscal year shall begin on the first of January and end on the last day of December.

Article 6
Bylaws_____

Amendments

Changes to bylaws shall be made available to all WIFDWC members for review at least one month prior to the next business meeting. A two-thirds majority is required to pass a motion to amend existing bylaws if the vote is held at a business meeting. An affirmative vote from at least 26 members is required to approve a motion voted on by electronic balloting (i.e., e-mail ballot, web poll, etc.).

Article 7
Meetings_____

Frequency

The WIFDWC endorses holding annual meetings but will, on vote of the membership, change the time of any particular meeting when circumstances dictate that such action be taken.

Date

WIFDWC endorses holding meetings in late summer but will change the interval between any two meetings when circumstances dictate that such an action be taken. Meeting dates will be set by the Executive Committee for each meeting.

Registration

Registration will be reduced by half, if possible, for graduate students and Honorary Life Members. It will be at the discretion of the WIFDWC Executive Committee for each meeting to offer a further

reduction in fees to graduate students and Honorary Life Members and to offer further reduced fees to others such as retired professionals and visitors.

Article 8
Committees_____

There shall be two types of committees, namely

a) Standing Committees – as designated in the by-laws, and

b) Ad Hoc Committees – as appointed by the Conference Chairperson to serve for a term specified by the Chairperson.

The chair of each standing committee shall prepare a report of the committee activities for the membership. The report will be submitted by the publication deadline to the Secretary for inclusion in the proceedings.

The following are WIFDWC standing committees:

- Executive Committee

○ Composed of the elected Conference Chairperson, Secretary, Treasurer, Historian and Web Coordinator.

○ The Conference Chairperson may appoint a Program Chair, Local Arrangements representative(s) and other persons as necessary to carry out the business of the next WIFDWC meeting.

○ The Executive Committee may invite non-member speakers to the annual meeting and pay their travel expenses from conference registration fees.

- Awards Committee

○ Composed of three members with the longest serving member designated as chair.

○ Committee will be comprised of a representative from each of the following – a university employee, a public agency employee, and one member at large. At least one member should be from Canada.

○ The chair's term will be completed at the end of the annual business meeting and a new junior member will be appointed by the Conference Chairperson. The most senior serving member will assume the chair for the next year.

○ The chair will provide a report of activities at the annual business meeting.

○ Responsible for accepting and evaluating nominations and determining recipients of the WIFDWC Outstanding Achievement Award as outlined in Article 10.

- Student Scholarship Committee

○ Composed of four members with the longest serving member designated as chair.

○ The chair will provide a report of activities at the annual business meeting.

○ The committee will be comprised of at least one representative from a university.

○ Replacement of committee members will be by election at the annual business meeting.

○ The committee is responsible for fundraising to finance any awards given by the committee.

○ The committee is responsible for determining and advertising the award application criteria, receiving and evaluating applications and determining recipients of the WIFDWC Student Travel Awards as outlined in Article 10.

- Hazard Trees Committee,
- Dwarf Mistletoe Committee,
- Root Disease Committee,
- Rust Committee,
- ~~Disease Control Committee~~ [disbanded 2002],

- Nursery Pathology Committee [approved 2002],
- Foliage and Twig Diseases Committee [established 2007, approved 2009],
- Climate Change Committee [established 2007, approved 2010].

Ad hoc committees are established by the Conference Chairperson to carry out various functional needs (e.g., the annual Nominating Committee). Ad hoc committees carry out specific, normally short term, tasks required by the membership. The terms of reference for ad hoc committees will be determined by the Conference Chairperson in consultation with the membership.

Article 9
Proceedings_____

Papers for each year's proceedings must be submitted to the Secretary by the deadline set for each conference by the Secretary.

Distribution of proceedings is made to all paid registrants and honorary members who have indicated a desire to receive them and will be made available to others at cost.

Article 10
Awards_____

Outstanding Achievement Award

Members may recognize outstanding achievement in the field of forest pathology by bestowing the WIFDWC Outstanding Achievement Award. The award will recognize an individual that has, in the opinion of the membership, contributed significantly to the field of forest pathology in western North America.

The award will be presented during the conference by the chair of the Awards Committee or designate. The recipient will receive a framed certificate or plaque. The recipient will present a keynote address at the following year's WIFDWC. A list of recipients will be published in the proceedings.

Members may nominate other current or active members for the award; they may not nominate themselves. A member may only make one nomination each year. A nomination must include: a short introductory letter, a narrative of the nominees qualifications, educational background, work history, etc., letters of support from other members and organizations, and copies of a few of the nominee's published works. Nominations are due no later than three months prior to the start of next year's conference and must be sent to the Awards Committee chair.

The Awards Committee may decide to not make an award if no suitable candidates are nominated.

Student Travel Awards

Members encourage participation in the annual conference by students engaged in studies in the field of forest pathology by bestowing the WIFDWC Student Travel Awards to enable their attendance. The awards are intended for students currently enrolled in a university graduate level program with a thesis or dissertation topic relevant to the field of forest pathology. The awards are intended to assist with conference-related expenses.

Criteria for application and selection of award recipients will be determined by the committee and made public at least four months prior to the early registration date for the meeting or by the first WIFDWC mailing. Completed applications are due by the deadline set by the committee.

The awards will be presented at least four weeks prior to the early registration date for the conference by the chair of the committee or designate. The recipients will receive an award of up to

US$500 depending on funding availability. Recipients will be required to make an oral or poster presentation at the meeting for which they received the award. Oral presentations are preferred. The committee may decide to not make an award if no suitable candidates apply.

Select Motions and Decisions_____

1998

Outstanding Achievement Award—established.

1999

Honorary Life Members—members added and provisions discussed (see 1996 Proceedings for historic retrospective on HLM).

Assisting Outside Speakers—amendment passed.

Website—Committee Reports and Meeting synopsis by the Chairperson would be posted; web committee (Baker, Muir, and Adams) formed.

2000

Outstanding Achievement Award—staggered committee established and recommendations made.

Joint Meetings with WFIWC—motions passed to meet in 2004, have dual program chairs, form a planning committee in 2001 for the joint meeting.

2001

Standing Committees—proposal to reorganize Disease Control Committee tabled.

2002

Standing Committees—motion passed to disband the Disease Control Committee and establish a Nursery Pathology Committee.

2004

Outstanding Achievement Award—changes to the Bylaws for this award were proposed and accepted by the membership.

Executive Committee—motion to make Webmaster an official position on the committee was approved.

2007

Standing Committees—motion passed to create both an ad hoc Foliar and Shoot Diseases Committee and a Climate Change Committee.

2008

Digital Proceedings—motion to make WIFDWC proceedings available on the website was approved.

2009

Standing Committees—motion passed to confirm the Foliage and Twig Diseases Committee as a standing committee.

2010

Standing Committees—motion passed to confirm the Climate Change Committee as a standing committee.

Fund Raising—the first WIFDWC Silent Auction was held to raise funds for graduate student travel awards.

2011

Standing Committees—motion passed to add the Student Scholarship Committee as a standing committee.

Business Meeting—motion passed outlining requirements needed to pass a motion by means of an electronic ballot.

2012

Finances—motion passed to hire a tax consultant for WIFDWC taxes.

Student Travel Award—motion passed to recommend to the program chair of each meeting to allow time in the program for each student receiving a travel award to present their work.

Deceased members – a moment of silence or tribute will be given for deceased members.

Regional Reports – motion passed for the Secretary to request regional reports in a standard format prior to the meeting and distribute reports at the meeting.

Joint Meetings with WFIWC- motion passed for the fall 2016 Executive Committee to consider having joint meeting with WFIWC.

2013

Officers- motion passed for Kristen Chadwick to maintain mailing and member list up to date, not the Secretary as specified in the bylaws.

Fund Raising- motion passed to increase regular registration rates by $15 to go to student travel award.

2014

Joint Meetings with WFIWC- conference chair will send an invitation to the WFIWC chair to hold a joint meeting in 2018 at a location in the US.

2015

No New Motions Passed

2016

WIFDWC Website - Danny Norlander will investigate in conjunction with the 2017 planning committee for hosting WIFDWC 2017 website on a non-federal option. WIFDWC will invest funds.

International Funds - funds should be used for international travelers to attend meetings in Canada or the states, but not to fund regular Canadian/American members to attend American or Canadian meetings, respectively.

2017

Fund Raising – motion passed to raise the portion of registration fees used for the student travel awards to $25.

2019

No New Motions Passed

2022

No New Motions Passed to amend Bylaws.

Past Annual Meeting Locations and Officers, 1953—2022

Meeting	Year	Location	Chairperson	Secretary-Treasurer	Program Chair	Local Arrangements
1	1953	Victoria, BC	R. Foster			
2	1954	Berkeley, CA	W. Wagener	P. Lightle		
3	1955	Spokane, WA	V. Nordin	C. Leaphart	G. Thomas	
4	1956	El Paso, TX	L. Gill	R. Davidson	V. Nordin	
5	1957	Salem, OR	G. Thomas	T. Childs	R. Gilbertson	
6	1958	Vancouver, BC	J. Kimmey	H. Offord	A. Parker	
7	1959	Pullman, WA	H. Offord	R. Foster	C. Shaw	
8	1960	Centralia, WA	A. Parker	F. Hawksworth	J. Parmeter	K. Shea
9	1961	Banff, AB	F. Hawksworth	J. Parmeter	A. Molnar	G. Thomas
10	1962	Victoria, BC	J. Parmeter	C. Shaw	K. Shea	R. McMinn
11	1963	Jackson, WY	C. Shaw	J. Bier	R. Scharpf	L. Farmer
12	1964	Berkeley, CA	K. Shea	R. Scharpf	C. Leaphart	H. Offord
13	1965	Kelowna, BC	J. Bier	H. Whitney	R. Bega	A. Molnar
14	1966	Bend, OR	C. Leaphart	D. Graham	G. Pentland	D. Graham
15	1967	Santa Fe, NM	A. Molnar	E. Wicker	L. Weir	P. Lightle
16	1968	Coeur D'Alene, ID	S. Andrews	R. McMinn	J. Stewart	C. Leaphart
17	1969	Olympia, WA	G. Wallis	R. Gilbertson	F. Hawksworth	K. Russell
18	1970	Harrison Hot Spring, BC	R. Scharpf	H. Toko	A. Harvey	J. Roff
19	1971	Medford, OR	J. Baranyay	D. Graham	R. Smith	H. Bynum
20	1972	Victoria, BC	P. Lightle	A. McCain	L. Weir	D. Morrison
21	1973	Estes Park, CO	E. Wicker	R. Loomis	R. Gilbertson	J. Laut
22	1974	Monterey, CA	R. Bega	D. Hocking	J. Parmeter	
23	1975	Missoula, MT	H. Whitney	J. Byler	E. Wicker	O. Dooling
24	1976	Coos Bay, OR	L. Roth	K. Russell	L. Weir	J. Hadfield
25	1977	Victoria, BC	D. Graham	J. Laut	E. Nelson	W. Bloomberg
26	1978	Tucson, AZ	R. Smith	D. Drummond	L. Weir	R.Gilbertson
27	1979	Salem, OR	T. Laurent	T. Hinds	B. van der Kamp	L. Weir
28	1980	Pingree Park, CO	R. Gilbertson	O. Dooling	J. Laut	M. Schomaker
29	1981	Vernon, BC	L. Weir	C.G. Shaw III	J. Schwandt	D. Morrison R. Hunt
30	1982	Fallen Leaf Lake, CA	W. Bloomberg	W. Jacobi	E. Hansen	F. Cobb J. Parmeter
31	1983	Coeur d'Alene, ID	J. Laut	S. Dubreuil	D. Johnson	J. Schwandt J. Byler
32	1984	Taos, NM	T. Hinds	R. Hunt	J. Byler	J. Beatty E. Wood
33	1985	Olympia, WA	F. Cobb	W. Thies	R. Edmonds	K. Russell
34	1986	Juneau, AK	K. Russell	S. Cooley	J. Laut	C.G. Shaw III
35	1987	Nanaimo, BC	J. Muir	G. DeNitto	J. Beatty	J. Kumi
36	1988	Park City, UT	J. Byler	B. van der Kamp	J. Pronos	F. Baker
37	1989	Bend, OR	D. Goheen	R. James	E. Hansen	A. Kanaskie

Meetings and Officers, 1953—2022 (cont.)

Meeting	Year	Location	Chairperson	Secretary	Treasurer	Program Chair	Local Arrangements	Historian	Web Coordinator
38	1990	Redding, CA	R. Hunt	J. Hoffman	K. Russell	M. Marosy	G. DeNitto		
39	1991	Vernon, BC	A. McCain	J. Muir	K. Russell	R. Hunt	H. Merler		
40	1992	Durango, CO	D. Morrison	S. Frankel	K. Russell	C.G. Shaw III	P. Angwin		
41	1993	Boise, ID	W. Littke	J. Allison	K. Russell	F. Baker	J. Hoffman		
42	1994	Albuquerque, NM	C.G. Shaw III	G. Filip	K. Russell	M. Schultz	D. Conklin T. Rodgers		
43	1995	Whitefish, MT	S. Frankel	R. Mathiasen	K. Russell	R. Mathiasen	J. Taylor J. Schwandt		
44	1996	Hood River, OR	J. Kliejunas	J. Beatty	J. Schwandt	S. Campbell	J. Beatty K. Russel		
45	1997	Prince George, BC	W. Thies	R. Sturrock	J. Schwandt	K. Lewis	R. Reich K. Lewis		
46	1998	Reno, NV	B. Edmonds	L. Trummer	J. Schwandt	G. Filip	J. Hoffman J. Guyon	D. Morrison	
47	1999	Breckenridge, CO	F. Baker	E. Michaels Goheen	J. Schwandt	J. Taylor	D. Johnson		J. Adams
48	2000	Waikoloa, HI	W. Jacobi	P. Angwin	J. Schwandt	S. Hagle	J. Beatty		
49	2001	Carmel, CA	D. Johnson	K. Marshall	J. Schwandt	A. Kanaskie	S. Frankel		
50	2002	Powell River, BC	B. van der Kamp	H. Maffei	J. Schwandt	P. Hennon	S. Zeglen R. Diprose		
51	2003	Grants Pass, OR	E. Hansen	B. Geils	J. Schwandt	H. Merler	E. Michaels Goheen		
52	2004	San Diego, CA	E. Goheen	B. Lockman	J. Schwandt	H. Merler K. Lesiw	J. Pronos J. Kliejunas S. Smith		
53	2005	Jackson, WY	M. Fairweather	H. Merler J. Guyon	J. Schwandt	K. Burns	J. Hoffman F. Baker J. Guyon		
54	2006	Smithers, BC	K. Lewis	M. Jackson	J. Schwandt	B. Lockman	A. Woods		
55	2007	Sedona, AZ	S. Zeglen	M. McWilliams	J. Schwandt	J. Worrall	M. Fairweather B. Geils B. Mathiason		
56	2008	Missoula, MT	G. DeNitto	F. Baker	J. Schwandt	W. Littke	B. Lockman M. Jackson		

Bylaws passed in 1998 WIFDWC Business Meeting identify officers as chairperson and secretary elected at annual business meeting and treasurer and historian, elected every five years.

Meetings and Officers, 1953—2022 (cont.)

Meeting	Year	Location	Chairperson	Secretary	Treasurer	Program Chair	Local Arrangements	Historian	Web Coordinator
57	2009	Durango, CO	G. Filip	J. Adams	J. Schwandt	D. Shaw	K. Burns B. Jacobi J. Worrall R. Mask J. Blodgett	R. Sturrock	J. Adams
58	2010	Valemount, BC	R. Sturrock	M. Fairweather	J. Schwandt	D. Goheen	M. Cleary R. Reich		
59	2011	Leavenworth, WA	P. Angwin	S. Zeglen	H. Kearns	A. Kanaskie	G. Filip A. Saavedra A. Ramsey-Kroll D. Omdal		
60	2012	Tahoe City, CA	A. Woods	J. Browning	H. Kearns	P Hennon	P. Cannon B. Woodruff		
61	2013	Waterton Lakes National Park, AB	R. Reich	K. Chadwick	H. Kearns	B. Lockman	T. Ramsfield		
62	2014	Cedar City, UT	M. McWilliams	M. Murray	H. Kearns	J. Worrall	J. Guyon		
63	2015	Newport, OR	A. Kanaskie	A. Ramsey	H. Kearns	E. Goheen	K. Chadwick A. Kanaskie G. Filip D. Shaw		S. Romero
64	2016	Sitka, AK	P. Hennon	B. Goodrich	H. Kearns	H. Kope	R. Mulvey P. Hennon		B. Lilly
65	2017	Parksville, BC	H. Kope	C. Cleaver	H. Kearns	D. Shaw	S. Zeglen	E. Becker	D. Norlander
66	2019	Estes Park, CO	K. Burns	G. Reynolds N. Wilhelmi	H. Kearns	J. Stewart	J. Stewart K. Burns J. Blodgett	E.	D. Norlan
	2020-2021	No WIFDWC held due to Global COVID-19 Pandemic							
67	2022	Held Virtually Online due to COVID-19 Pandemic	S. Navarro	B. Oblinger	H. Kearns	M.-S. Kim.		E. Becker	D. Norlander

Bylaws passed at 1998 WIFDWC Business Meeting identify officers as chairperson and secretary elected at annual business meeting and treasurer and historian, elected every five years.

In Memoriam

Roy Davidson Whitney 1927-2020

Roy was born on December 30, 1927 in Langdon, Alberta where he grew up and died on May 19, 2020 in Calgary, Alberta. Roy will be remembered and missed by his wife of 67 years, Georgina, son Philip, son Brian, daughter Diane, daughter Susan, brother Stuart, sister Jean Cathro, as well as seven great grandchildren, and numerous other relatives and friends. He is predeceased by his brother Norman and his sister Catherine Scotcher.

Roy met and married Georgina Lapp in Saskatoon, Saskatchewan. He completed his BSc. in Forestry at the Univeristy of British Columbia in Vancouver. He then completed his MSc. in Forestry at Yale University in New Haven, Connecticut. Roy earned a PhD in Plant Pathology at Queen's University in Kingston, Ontario. His graduate research included work on stand opening disease, also known as tomentosus root and butt rot, of spruce.

He was a forest pathologist for the Canadian Government for 43 years. His pathology career first took him to Saskatoon, Saskatchewan where he worked for 13 years and then to Winnipeg, Manitoba for five years. He went on to work in Sault Ste. Marie, Ontario for 25 years. He was a great mentor to many people and inspired others to pursue careers in forest pathology and natural resources. Roy was acknowledged globally as an authority of root diseases on conifers and his research led to changes in reforestation practices.

Roy also helped create training videos transferring science into management when it was uncommon for video format. He wrote a number of scientific publications from his studies and spent decades contributing to new findings involving tomentosus root rot, studied Armillaria root rot and other root diseases. As another Canadian forest pathologist, Mike Cruickshank, noted, "Roy conducted research into one of the most difficult areas in forest pathology: field studies on impacts of root and butt rots." Some examples of publications where he shared his research on tomentosus root rot include the following.

Whitney, R. D. (1962). Studies in forest pathology XXIV *Polyporus tomentosus* Fr. as a major factor in stand-opening disease of white spruce. *Canadian Journal of Botany* 40, 1631-1658.

Whitney, R. D. (1963). Artificial infection of small spruce roots with *Polyporus tomentosus*. *Phytopathology* 53, 441-443.

Whitney, R. D. (1964). Hardwoods as inoculum carriers for *Polyporus tomentosus* inoculations. *Phytopathology* 54, 1484-1485.

Whitney, R. D. (1966). Germination and inoculation tests with basidiospores of *Polyporus tomentosus*. *Canadian Journal of Botany* 44, 1333-1343.

Whitney, R. D. (1973). Root rot losses in upland spruce at Candle Lake, Saskatchewan. *The Forestry Chronicle* 49, 176-179.

Whitney, R. D. & Boyhachuck, W. P. (1976). Pathogenicity of *Polyporus tomentosus* and *P. tomentosus* var. *circinatus* on seedlings of 11 conifer species. *Canadian Journal of Forest Research* 6, 129-131.

Whitney, R. D. & Boyhachuck, W. P. (1977). Variation of *Polyporus tomentosus* Fr. as a major factor in stand-opening disease of white spruce. *Canadian Journal of Botany* 55, 1389-1398.

Whitney, R. D. (1980). *Polyporus tomentosus* root and butt rot of trees in Canada. Tomentosus Genetics and Epidemiology- Literature Review 13. *Proceedings of the 5th International Conference on Problems of Root and Butt Rot in Conifers.* L. DimitriKassel, Germany: IUFRO.

Whitney, R. D. (1989). Root Rot damage in naturally regenerated stands of spruce and balsam fir in Ontario. *Canadian Journal of Forest Research* 19, 295-308.

Whitney, R. D. (1993). Damage by Tomentosus root rot in white spruce plantations in Ontario, and the effects of thinning on the disease. *The Forestry Chronicle* 69(4), 445-49.

Whitney, R. D. (1995). Root rotting fungi in white spruce, black spruce and balsam fir in northern Ontario. *Canadian Journal of Forest Research* 25, 1209-30.

Whitney, R. D. (2000). *Forest Management Guide for Tomentosus Root Disease*. Ontario Ministry of Natural Resources: Science Development and Transfer.

In his personal life, Roy was an avid Saskatchewan Roughriders football fan throughout his life. He loved the great outdoors and enjoyed maple syruping, gardening, cutting firewood, picking berries, playing and coaching hockey, and walking his dogs. He particularly enjoyed hunting and fishing trips with his friends and family. Another passion of Roy's was speed skating which he began in his fifties. He still holds a number of Canadian national records and one world speed skating record for the 5,000 m race for men over 70 years of age. Roy was a sincere and devout Christian enjoying the fellowship and activities of his church families. Roy was a colourful character with clothes to match and repeatedly showed his passion, love for life and humor.

Roy was an Honorary Life Member of WIFDWC and will be missed.

(Information provided by the family of Roy Whitney, the *Calgary Herald*, and colleagues)