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**March 11, 2025**

**Service Forester Introductions:** Hannah Payne and Sheri Steckler

Hannah Payne and Sheri Steckler shared a few details about their backgrounds, their roles as UCF SF including assistance provided and service areas. Hannah and Sheri explained their additional roles as Inventory and Volunteer/Partnership Coordinators (respectively) for the entire state.

**Insurance Coverage Basics, Montana Municipal Interlocal Authority, MMIA:**

Patrick Plantenberg

1. Montana Municipal Interlocal Authority (MMIA) represents Tree Board Members covered under the umbrella of the local governments’ policies.
2. Since 1986, MMIA has been self-funded by communities.
3. They offer a comprehensive risk management program to improve productivity and reduce claims and workplace injuries.
4. MMIA offers an endowment designed to assist municipalities with training efforts and to encourage training partnerships amongst Montana’s cities and towns. Up to $2,000.00 to help fund risk management training programs are available if conditions are met:
5. At least 10% of MMIA members required participation for endowment funds.
6. Only one endowment per member, no more than $4,000.00 a year.
7. Patrick has a list of communities covered (127 members).
8. How to get coverage through your city: Purchase an endorsement on the city’s existing policy to cover volunteers or purchase insurance by the day.
9. Ask MMIA about how to cover volunteers prior to volunteer work being done.
10. Website/Risk Management Resources:
	1. https://mmia.net/risk-management/resources
	2. Ladder Safety and Sidewalk sections
	3. Risk Management Training Endowment
11. Limiting Risk: Tree Inventories and Management Plans
12. Inventory
13. RECORD KEEPING!! Maintain tree inventory and keep it up to date (removals, maintenance, etc).
* Address maintenance/pruning, removals, issues: utility lines, sidewalks, visibility triangle problems, water shutoff valves, underground and overhead utility line conflicts, etc.
* Take care of maintenance issues, do not inform MMIA of them, know what you have and mitigate risks.
* Tree Care Maintenance Plan
1. Develop a plan and keep extensive, current records of tree damage, issues, and mitigate them.
* Document date, location, inventory tree number, tree board/volunteer hours doing the work, equipment hours, etc.
* All information needed for claims, will also come in handy for grants and ADF TCUSA applications.
1. Homeowner responsibility for public trees adjacent to their property:
2. Cities cannot pass off liability to the homeowners.
3. The city has to enforce the ordinance.
4. Hannah Payne: Tree Board Liability Mention
* Ordinances/code enforcement: In many places new residents are moving in and starting to hold local governments accountable per their ordinances.
* Code enforcement officers can help relieve clerks of enforcement workloads.

**Utility Session:** Levi Arnio—Moderator/Vegetation Coordinator for NWE

1. Panelists:
2. Dave Hack, NWE Vegetation Coordinator
3. Scott Burnhardt, NWE Vegetation Coordinator
4. If you need assistance regarding pruning and powerlines, call 888-467-2669 number and you will be forwarded to the correct contact.
5. Kyle: Bonneville Power Association
6. Reach Kyle at krgoeke@bpa.gov
7. Chad Basset: Flathead Electric
8. Contact Chad: Vegetation Clearance Line Supervisor
9. Call Flathead Electric at: (406) 751-4483.
10. Flathead Electric website: [https://www.flatheadelectric.com/.](https://www.flatheadelectric.com/)
11. Utility line slide: anatomy of power lines
12. Utility Line Clearance Certified Workers required to work within 10 feet (OSHA Rule) of those lines. Utility companies trim within these safety zones free of charge for municipalities.
13. Utility companies do not trim service line to house but do disconnect/reconnect the service free of charge for private trimming operations. If you have any questions or concerns about your service line, please call your energy service provider.
14. Programs to assist homeowners/communities to remove trees under utility lines:
15. Chad—Free disconnect/reconnect, encourage members to call if they need help and will come out to do an assessment. 15-day notification to homeowners, knock on the door, door hangers.
16. Kyle—High voltage only, will remove trees if homeowners request but go through a different process. Try to connect with property owners to notify them of clearance work scheduled. Mailers sent out, Kyle knocks on doors and lets homeowners know in person. Rotation every 6 years unless deemed necessary to revisit sooner.
17. Scott—NWE, looking for partnerships, “Right Tree, Right Place”. Have MOUs with cities to address trees not suitable for planting under power lines. Bozeman, Great Falls, Billings, Dillon, cut trees down, chip 4” or lower, city grinds stump, NWE contributes $275.00 toward replacement tree (smaller, approved for planting beneath power lines).
18. Dave—5-year cycle, offer to remove declining trees near power lines for customers at no cost. Tree replacement program with municipalities and private property owners. Notifications to public/cities: Get a spreadsheet identifying street trees, indicate candidates for trimming and removals, notify the city ahead of time.
19. NWE: Work in the WUI, service interruption, outages, list of what will be worked on for the year. Tree crews working in Hamilton district work on different circuits on the system. Varies every year. Contact city with work order and provide notifications and identify what work has been done. Also try to contact all of the property (and adjacent) owners as well.
20. Scott will forward Pat a copy of an MOU and NWE has funding to enter into new MOUs.
21. Do your employees have to do volunteer service hours each year?
22. Chad—Kiwanis, Tree Boards, other organizations really step up to help out. Arbor Day Celebration participation: Flathead Electric is the most popular booth at Kalispell’s AD Celebration! Bucket truck demonstration, zap board, hazard awareness, tree ID for 3rd graders.
23. Scott—Not required but encouraged. Work with local organizations.
24. Dave—Local organizations in different communities have been willing to volunteer.
25. Montana Electric Cooperatives’ Association:
26. Complimentary line service line drops. Call your co-ops with questions and concerns regarding power lines and trees.
27. Can co-ops work in urban areas as volunteers to help remove trees?
28. Chad—If it was in conflict with utility lines they would come out and assist with mitigation. If not in conflict they could still come out and assess the utility issue.

**Lightning Round:** Storm Damage

1. Importance of Emergency Storm Response Plans
2. More frequent, severe weather events causing many different hazards
3. Missoula wind event: 3 contracted groups
	* + Northwestern Energy brought in 22 crews, issues with supporting lodging and meals for crew members
		+ Set up command center and structure
		+ (Nate) worked on highest voltage first
		+ Utility foresters patrolled and cleared branches from lines
4. Certified line clearance professionals to work within 10 feet of electrical utility lines.
5. Hire ISA certified arborists for non-electrical tree work. Beware of storm chasers who do shoddy work, are unsafe, and may not honor their part of contract/agreement.
6. Jurisdiction and partnerships: city, county, state, federal, contractors, non-profits.
7. Create and revise city ordinances, create with community input.
8. Update after a storm or city leadership requests it.
9. DNRC partnered with Missoula City Forester
	1. (Michaela from Dillon Tree Board) County Assistant Team (CAT) potential for partnership
	2. FEMA Disaster Declaration has to be signed by the president
		1. State level of declaration
		2. (Amy Fox) Hamilton had a better outcome getting reimbursements from the state instead of FEMA
10. Tree Board Role: Volunteer to advise city department in charge of urban forest.
11. Customize ordinance specific to the needs of your community, don’t just copy and paste a model ordinance.
12. Who has liability: Give responsibility of street tree maintenance to adjacent property owner and may try to transfer liability to them as well.
13. Trees are part of the city’s green infrastructure. Hold both the city and adjacent homeowners to standards of maintenance.
14. ANSI Standards for tree care. Reference in your ordinance.
15. Enforcement and Permitting
16. Ordinance should determine what the city is willing to and has capacity to enforce.
17. Community Buy-in: Benefits of Trees. Tree Boards are integral in educating citizens of their communities.
18. Buy-in from local government leaders

**Strategies for More Effective Tree Ordinances:** Dr. Paul Ries

1. Ask questions, why do you need a tree ordinance
	1. Improve health of urban forest, reduce liability, public safety, etc.
2. Citizen and community leader engagement
3. Outreach and education
4. Types of tree ordinances, public and tree protection (i.e. during development)
5. Typical Basic Ordinance Clauses
6. Title, Findings, Purpose and Intent, Applicability
7. Definitions
8. Authority and Power
9. Advisory or Authority Board Establishment and Terms
10. Requirements for City Departments
11. Licensing and Insurance
12. Landscaping and Provisions for Trees
13. Permits and Enforcement
14. Strategies for effective ordinances:
15. Do your homework
16. Provide both flexibility and rigidity
17. Set performance standards
18. Use clear, understandable language
19. Utilize resources for assistance
20. Evaluate ordinances every 3-5 years and revise as needed
21. Plan ahead for updating
22. Watch out for pitfalls of sample or model ordinances to ensure your ordinance is relevant and tailored to the needs of your community
23. Liability, permitting, enforcement, penalties, claims, and appeals

Tree Boards

1. Tree boards are a part of participatory democracy
2. Members lend perspective and legitimacy
3. Members provide review, feedback, action
4. Become a more effective board
5. Diversify membership
6. Develop strategies for effectiveness
7. Seek opportunities for impact
8. Raise your profile
9. Use available resources for training

**Day 1 Take aways:**

UCF Foresters:

1. Contact your service forester for assistance
2. Hannah and Sheri have cards at the back table with our contact information on them.

Insurance Coverage Basics:

1. Check with MMIA or your local government insurance provider to determine what additional coverage you need to protect tree board members and volunteers from liability associated with city tree operations performed. Annual or event coverage
2. Document, document, document!!
3. Tree inventory, 5-year tree maintenance plans, tree care/removal records, tree board volunteer hours, etc.

Utility Session:

1. Utility Line Clearance: Certified Workers required to work within 10 feet (OSHA Rule) of those lines. Utility companies trim within these safety zones free of charge for municipalities.
2. Contact your power service provider for information about tree care services near power lines and programs to replace removed trees under power lines. Companies may be able to engage in volunteer opportunities like Arbor Day Celebrations.
3. Always assume utility lines are hot electrical, even if you’re not sure which type of utility is running through them.
4. Funding

Lightning Round: Storm Damage

1. Importance of Emergency Storm Readiness and Response Plans
2. Natural disasters
3. Update after a storm or when city leadership requests it.
4. Tree Board Role: Volunteer to advise city department in charge of urban forest.
5. Who has liability: Does the city pass on responsibility of street tree maintenance to adjacent property owners?
6. Enforcement and Permitting

Strategies for More Effective Tree Ordinances:

1. Ordinance creation and updating
	1. Listen, find out what works in other communities and what your needs are
	2. Flexible Rigidity: Ordinance has teeth but is not so rigid it cannot be enforced.
	3. Performance Standards: fencing materials specified
	4. Use clear language that is easy to understand
	5. Know where to get help: Montana UCF Program, RM ISA Chapter
2. Focus on what needs to be covered:
3. Evaluate 3-5 years after adoption and regularly thereafter. People, Canopy, Record Keeping
4. Link ordinance to management plan, make trees a necessity
5. Tree Board: Diversify membership, Develop strategies for effectiveness, Training Resources: Tree Board University
6. Ordinances are easier to enforce with community support, tree management plans and expressed goals for urban forest.

Tree Protection Ordinance

1. Retain existing trees
2. Do not protect every tree
3. Protect high-value trees

Diversify Tree Boards!

**March 12, 2025**

**Grant Writing and MUCFA FAP Small Grant Opportunity:** Kelly Franklin

1. Concept Map/Sticky Notes, can be messy, get outline. GET IDEAS ON THE PAGE! Something, anything!
2. How, What, Why, Who, Where, When
3. Grant Writing: Stages of Writing, getting started. You can move back and forth between stages, get ideas on page, brainstorm, edit, organize and clearly define your ideas, proofread and edit final draft.
4. Critique your draft, review and edit based on your target audience
5. Be messy! Separate drafting from editing. Turn off spell check, don’t go back to make corrections like punctuation.
6. Research: Before and during your grant application process
7. Pretend you are writing to someone you are comfortable with rather than a grant committee.
8. Editing Strategies: don’t lose your voice if using AI, get another set of eyes on it, read what you’ve written out loud, let someone else read it to you, get feedback, have someone proof, read sentences from end of document to beginning. Use templates or examples of previous successful grant applications for content and structure.
9. Piece things out to keep writing task specific to each section or question. Jot down notes and ideas in a separate notebook to revisit later. Focus on one task at a time, Pomedora Method, work in blocks of time and take breaks!
10. Resource opportunities available through Montana League of Cities and Towns, Local Community Foundations, Corporations, Counties.
11. MUCFA FAP small financial assistance opportunities for: Tree Inventories, 5-year management plans, pruning, removal and replacement, Tree Board creation/revival, trainings and workshop attendance.
12. Upcoming events can be found on MUCFA’s website: <https://www.mucfa.net/calendar-events>

**Inventory-Conducting New, Maintaining, and Platform Information:** Hannah Payne

1. Inventory: Documents and assesses trees in a defined area
2. Benefits of Inventories: DNRC uses your communities’ inventories to develop management and preparedness plans, apply for grants
3. Map of 63 MT towns inventories, Virginia City is scheduled for an inventory in 2025
4. Types of Inventories
5. Windshield Reviews, Sampling—Random parts of town to get a snapshot of a community’s canopy, parks and cemeteries is a good place to start in getting a foot in the door with some communities’ public works departments.
6. Complete Inventory, Hannah’s favorite, “I can tell you that it is very satisfying to conduct a complete inventory”!
7. How communities are selected for inventory
8. Hannah needs assistance from communities in order to complete inventories.
9. Tree Boards
10. City Council
11. Citizens/Volunteer Groups
* What are you going to do with or what have you done with your inventory?
1. Are you putting it to use and updating your inventory? Update your inventory as trees are added or removed, don’t wait!
* It is much easier to update your inventory every 5 years, Hannah recommends, than to start a new inventory from scratch! You also maintain historical data collected if you’re updating your inventory regularly instead of starting a new inventory.
1. Goal of 30% Tree Canopy Cover is attainable
2. 10-20-30%: Species, Genus, Species
3. Stats: Demonstrate the need for diversity in our urban forests
4. Mock Inventory: Cottonwood/Attributes: Data Collection

Tree Inventory Platform Changes

1. Tree Plotter will hopefully replace Tree Keeper soon. Data would transfer from old platform to new inventory system. More information will be available depending on what happens with the funding freeze.
2. Montana DNRC GIS Map will go live on March 31, 2025! If you need help with this, please contact Hannah!

**DNRC UCF Grants:** Janis Fontaine

1. Submittable:
2. Access Submittable through DNRC Grants and Loans Page, click Apply
3. Includes all DNRC Grants so you will have to scroll through to find UCF Grants <https://dnrc.mt.gov/grants-and-loans/>
4. All applications are now completed electronically via Submittable. Create an account if you need to and remember your username and password! The account owner can share with collaborators but will be the one to submit and get notifications.
5. Click on the link for the grant you would like to apply for. Read through the RFP announcement and all pertinent information.
6. Find your organization: If you have an account in Submittable, you can type in your organization name and pull it up for you OR click on Skip and Continue to Application and enter the applicant information to start your application.
7. Drafts can be saved! There is an autosave feature but click save frequently so you don’t lose anything!
8. Submit application when completed.
9. The Grants team can notify you if edits or updates need to be made after you have submitted.
10. Click on ‘My Submissions’ and then ‘Forms’ to view submitted and awarded grants, fill out reports, or request reimbursements.
11. Messages: All correspondence is here
12. Fillable Forms are found under ‘My Agreements’
13. Original application found here
14. Request for Reimbursement Forms: Access to fill out request here
15. Advances are/may be available upon request
16. Contact Janis to change ownership of Submittable Account or invite collaborator to work on a form or the application (only 1 unique collaborator for each section). Click on Add Collaborator at the top of each form.
17. For awards,10% of a single budget’s section can be moved to a different part of the grant project with pre-approval and doesn’t necessitate an amendment.
18. If more than 10% of the budget needs to be transferred to a different project area, an amendment will be required.
19. Extensions can also be requested, make the request at least a month in advance.
20. Program Reports: Biannual, Annual, Final Report
21. Read your agreements: Confirm where the funds come from
22. Period of Agreement: Not reimbursed for project work completed before the project date begins, unless there is a pre-award expenses approval. If an extension is needed, make a request for an extension at least 30 days before the agreement end date.
23. Project Budget: If something happens and your project needs to be adjusted during completion, let your grants professional know!
24. Completing a financial report
25. UCF grants are reimbursement based with the exception of the Tree Planting grant. Save documentation throughout the project to submit reimbursement requests.
26. How long does it take to get reimbursed?
27. Grants team process: within 30 days of reimbursement request packet submission. If more documentation is requested from the grants’ team, the 30-day period for reimbursement starts over.
28. Indirect Costs
	1. The percentage of time personnel spent on grant can be applied to total pay period compensation
29. Grant Agreements:
30. Start Date and Signatures
31. Definitions/examples for budget table sections:
	1. Salary, wages, and benefits: Personal Services
	2. Contractor: Contracted Services
	3. Operating Expenses: Travel, per diem, supplies, etc.
32. Alcohol, food (except for per diem), and entertainment are not reimbursable
33. Match has the same documentation criteria as requested funds
	1. Highlight/mark-up your reimbursement and match documentation to make reimbursement process faster!
34. Program Income Earned: Cost Sharing: not reimbursable for full amount of cost share item
35. Make sure Request for Reimbursement IS SIGNED!!
36. Report Worksheets (found in the award agreement) outline what information will be requested. Work on this document from the beginning of the award period instead of waiting until the end to make reporting an easier process for you.
37. ACH deposit or checks, direct deposit will get you the reimbursement more quickly
38. Federal Funding Freeze Update:
39. Stop Work Order: Effective February 21, 2025, to March 18. No project work done during the Stop Work Order will be allowed for reimbursement or match against awarded project.
40. Janis’s PowerPoint presentation can be found here:

 [ Submittable\_Access\_Request\_Forms.pptx](https://mtgov.sharepoint.com/%3Ap%3A/r/sites/DNR2025TreeBoardRetreat/Shared%20Documents/Submittable_Access_Request_Forms.pptx?d=wfd69d8c532384d6d8ea7c309de39cd4d&csf=1&web=1&e=pMftoa)

**Tour of Hamilton Stops:** Amy Fox

Ravali Street Improvements, River Park cottonwoods and pathway reconstruction project, gravel bed, downtown trees.

**Wildland Urban Interface:** Hannah Payne

Where the developed meets the undeveloped

* 1. Homes and recreational spaces
1. WUI widely distributed across the entire state – Grasslands: Fast, flashy fuels out east
2. State of MT Risk Reduction Zones Map: Direct and Indirect exposure, not a lot of minimal exposure
3. Firewise communities, neighborhoods – especially outside of city limits
4. Home Ignition Zone
5. Defensible Space
6. Firewise Landscape
7. Safety Zone
8. Ladder Fuels: animated slide
9. 100-300 feet, as you get closer to your home, spread trees out and try to bring fire to the ground.
10. First 5 feet around your house if critical buffer space
11. Video: Mulch and plants next to home, gutters full of debris, attic vents, roof valleys, etc. are often overlooked areas that require attention.
12. [The Firewise Demonstration Garden](https://tcfswg.org/projects/firewise-demonstration-garden/) in Montana City is a great example of Home Ignition Zone Fire-wise landscaping and native plants
13. DNRC offers on site [WUI Home Assessments](https://dnrc.mt.gov/Forestry/Resources/request-a-site-visit), check with county for resources as well.
14. Be prepared for an emergency evacuation, identification, and prescriptions.
15. Helena project LiDar technology identification of overhanging branches and roofing material type.
16. Link to Hannah’s presentation: [ UCF WUI.pptx](https://mtgov-my.sharepoint.com/%3Ap%3A/g/personal/cnd527_mt_gov/EU_YjvMAiCNMrPYTsH6dbecBVIAR1-cqWxRYjgbnrP9KYw)

**Tree Board Session:** Patrick Plantenberg

1. 5-Year Tree Care & Management Plans
2. Tree Ordinance passed now how do we manage our urban forest?
3. Start with an inventory
4. Recommendations: Short-Term
5. Trees of immediate concern vs trees that can be held off on
6. Depending on funding, come up with a plan to address all trees identified in inventory as needing work done (in the short and long term).
7. Work Plans—work with current capacity and budget
* Winter:
	+ Line out work for summer
	+ Apply for grants
1. Small tree pruning training for volunteers (first 5 years of new planting) – how many can be done in X number of years?
* Workforce development, train someone to do the work
1. Arbor Day Celebrations – Plan spring planting event
* Involve kids
* Expand in Forsyth, great way to get new tree board member interest.
1. Recommendations: Long Term
2. Develop an annual forestry budget: invest 10% of annual benefits of trees in your urban forest.
3. Develop pruning rotation, recommend X number of trees annually
* Spring: Large trees pruned: Request funds from council, prune what you are able to with what council is willing to invest.
* Fall: Prune X number of smaller trees, volunteers, city staff, contractors
1. Tree planting plans/goals, species diversity, identify planting spaces. Restrict planting of undesirable species.
2. Develop 10-Year Work Plan – X number of trees maintained over a certain period of time.

Tree Inventories

1. Tree Inventories can help identify more needs over time, what volunteers can do, how are we going to water trees, who will plant, water, prune, etc. for the next X number of years, set a canopy goal, etc.
2. How to increase tree canopy and diversification
3. What is the species make up of your urban forest
4. Size of trees: age classes
5. Which needs to be reduced, which new to plant, establish an arboretum
6. 10, 20, 30%: Species, genus, family
7. Priority trees: Small or Large Tree Immediate
8. Identify Criteria:
9. Condition: dead or dying, good, fair
10. Planting sites
11. Visibility Triangle identification
12. Power Line/Utility Conflicts
13. 5 ft from sprinkler heads
14. Sidewalk damage
* Determine whether public or private trees causing the issue and options for mitigation.
1. Inventories are crucial tools to go to council with and ask for funding to implement management plan based off of data collected during the inventory. Reduce liability for the city.

Tree Boards

1. Member Recruitment:
2. MSU Extension Agents, High School, Conservation Districts, USDA Forest Service, city employees: public works/clerks, businesses, gardening groups, clubs, local landscaper, master gardener, chamber of commerce, city beautification committees, Facebook/social media, have bylaws/board governance, recruit at farmer’s markets…
3. Work with your mayor and city council
4. Set up a Tree Board Advisory Council for interested citizens that can help the Tree Board.
5. Involve youth and teachers, 4-H, FFA, etc. in tree planting efforts to expand sources of funding, church youth groups too.
6. Make meetings fun, buy lunch
7. Does your TB have support from Public Works?
8. Is it possible for high school students in your community to be board members?
9. Requirement for city appointed committees to publicly post minutes
10. Maintain TCUSA Status, AD Celebration, sponsor workshops, explain inventory
11. Closing: Notification that a follow-up survey will be emailed to TBR participants soon. Please visit the TB resource page on MUCFA’s website: [https://www.mucfa.net/tree-boards](https://www.mucfa.net/tree-boards%20)

**Day 2 Takeaways:**

1. Grant writing
	1. The first draft is perfect
	2. Get ideas on paper, then take a step back before proceeding
	3. Visit: <https://www.mucfa.net/> for funding and training opportunities
2. Inventories
	1. Hannah Payne is the State Inventory Coordinator
	2. Purpose: Use them!
	3. Planning: Hannah will need assistance from communities to conduct inventories
	4. Interim tool will go live on March 31, 2025
3. DNRC Grants
	1. Applications, program, and fiscal reports in Submittable
	2. Read full awards and agreements
4. Hamilton Field Trip
	1. Open discussions: Park trail upheaval, downtown tree maintenance and improvements, gravel bed and its success
5. WUI
	1. Defensible space (assessments available)
	2. Several online resources
	3. Prepare home structure/materials
6. Tree Board
	1. Importance of maintenance plans, ordinances, recommended management plans base on inventory, board member recruitment, advisory councils

**March 13, 2025**

**Common Abiotic Issues Affecting Montana Trees/Shrubs:** Abi Saeed

1. Abiotic vs. Biotic:
2. Biotic: Caused by anything living: insects, animals, fungi, bacteria, etc.
3. Signs: Can happen gradually, species specific
4. Abiotic: Caused by non-living things: Physical, environmental, chemical, temperature extremes (marginally hardy species), weather events (hail), sunscald, frost cracks (sw side of tree), mechanical/physical injury: tree guards girdling, mowers girdling base, pesticides/salt—site history is important
5. Schutter lab: herbicide symptom analysis, rule out biotic issues, site history, mode of action of herbicide—you may be able to get further assessment submitting a sample to the analytical lab for chemical analysis
	1. Symptoms: can happen suddenly
	2. Wilting, leaf necrosis, chlorosis, bud freezing/die back=lack of flowers and
	3. Fruit, hail damage (wounds-entry points pathogens/insects), winter desiccation kill on evergreens
6. Predisposing Factors: Plant health issues/stressors predispose trees to secondary infections/infestations.
7. Herbicide: Mode of Action
	1. Amino Acid Synthesis Inhibitors: Stops growth and leads to slow death
	2. Glyphosate
		1. Symptoms: chlorosis, stunting, distortion, growth stops, slow death
	3. Growth Regulators: absorbed through soil or foliage, translocation
	4. 2,4-D, Dicamba
		1. Cupping, malformed growth, cracking/callousing of stems
	5. Soil Sterilants
8. Non-selective: pre or post emergent, water soluble, persist in soil
	1. Atrazine, bromacil, diuron
		1. Symptoms: extreme chlorosis, decline and death
9. Transplant Shock:
	* 1. Within the first 5 years of planting, root damage/reduction, reduced leaf size, dieback,
		2. Significantly reduced root systems, newly planted trees need extra care and regular watering after planting to pull them out of transplant shock.
10. Planting Too Deep:
	1. Restricts moisture and oxygen availability
	2. Trees are often already too deep (at the point of sale) in b & b and containers
	3. Flare root at ground level, lack of trunk taper indicates tree planted too deep
	4. Girdling roots: need to be corrected at the time of planting or they will continue to circle and girdle the tree below soil level and often is not noticed in time to save the tree
11. Water and Heat Stress Inspections:
	1. Symptoms in the upper canopy, heat stress in locations where tree is exposed to surfaces (lower canopy, trunk).
	2. Wind: Can cause up to 30% more water loss, scorching, breakage
	3. Landscape issues: spacing, mulch types, turf competition, irrigation systems
	4. Multiple abiotic issues happening simultaneously
12. Case Studies:
	1. Interactive: photos of abiotic symptoms on trees.
		1. Transplant shock on spruce
			* Heat/Drought/Transplant Shock on Crabapple
			* Herbicide application on Weeping Birch
			* Heat and Drought Stress on Linden
			* Desiccation/Winter Injury on Mugo pine
			* Glyphosate injury on raspberry
			* Transplant Shock/Heat Stress on Canada Red, lack of water

9. Will tree survive? Hard to say: How healthy has it been to this point? Has it been declining year after year? Late bud break, just wait it out and see, defoliation—will it leaf out again? Possibly, give it a little extra time

10. Stressed woody plant care: Prevent abiotic issues: species selection, protection, proper mulching, sufficient watering—through fall: dripline and beyond, proper planting location and technique, fertilizing: nutrient deficiency mitigation: trees should not be fertilized when they are stressed to discourage new growth—slow released fertilizer at planting is best, avoid high N fertilizer going into late summer/fall

11. Schutter Diagnostic Lab website: <http://diagnostics.montana.edu/>

1. Free Services: Schutter Diagnostic Lab—Submit a Sample, mostly samples for biotic issues. Photos for abiotic issues.
2. Urban IPM Alert on website

**Tree Care Pruning Workshop**: Patrick Plantenberg

1. Proper Plant Selection: Species and Quality
2. Proper Planting Techniques:
3. Assume tree from nursery is already too deep in the container, better to plant high, equipment dug holes—trees planted will settle if base of hole is not solid.
4. Right Tree/Right Place: Know your site, soil, native soil ideal, and what species needs are, power lines: smaller, suitable trees for planting under powerlines.
5. Make sure planting space is adequate through maturity!
6. Staking: Pat recommends 3 stakes, remove after 1 year. Use tree guards to protect trunks. WATERING!!! Crucial to establishment—at least 3 year watering schedule. Watering bags great the first year.
7. Football shaped planting space with edge and tapered up to center, tree planted at correct depth at ground level. Mulch in the planting hole will stay put, not wash our or blow away.
8. 4” edge minimum is ideal but could be 5-6”. Mulch will break down and settle, will have to be top-dressed/replenished annually. 4” layer of mulch (after settling), keeps weeds down, reduces moisture loss. No mulch volcanos!!
9. Root Ball Prep: Don’t wrap long roots around in the planting hole because they will girdle the tree below ground level eventually causing tree to die out.
10. Remove adventitious roods above flare root. Plant flare root at ground level. Remove any broken, dead, or girdling roots. Break up circling pattern of roots. Break solid ball
11. Apart to separate roots. Take off up to 30% of the roots.
12. Remove weeds
13. Colter makes hexagon root ball shape with Sawzall to eliminate circling roots
14. Pruning: ANSI A-300 Part 1 Pruning Standards and Best Management Practices, ISA Guidelines and Specifications
15. What tree, when, why, how
16. Research proper pruning schedule for each species.
17. Bird fly through it
18. Species/Time of Year:
19. Make sure central leader is established, especially elm, structural pruning may be required at planting time. Eliminate co-dominance. Stunt competing leader 30-70%
20. Public safety considerations: Lower branches will be pruned to above adult eye height, gradually over the first 5 years. Remove lower 1/3-1/2 of tree over time to develop 40-60% stem to crown ratio
21. 25 ft tree requires 9 inches between scaffold branches, 50 ft—18 inches, etc. 60% crown, 40% trunk. Achieve over time!!
22. Branching attachments: Opposite and Alternate
23. Pruning: 25% of canopy can be removed each year
24. Directional Pruning
25. Prune out dead
26. Who to contact for Tree Health Issues: County Extension Agents, Schutter lab in Bozeman
	1. Cytospora Canker in Spruce: Canker causing fungi causes girdling, killing above canker area. Rarely kill spruce but make them look bad.
27. Prune out and destroy branches in dry, dormant season.
28. Disinfect the pruning tools between each cut.
29. A lot of species susceptible: ash, apple birch, elm, willow, peach, cottonwood.
30. Fireblight: Bacteria, clean pruning tools after each cut. Rosacea—apple, pear, mountain ash.
	1. Treat with 50/50 mixture of water and Pentrabark per gallon on lower 5 feet (trunk) of tree in spring and fall. Before leafing out and when leaves turn in the fall. Be careful of drift on windy days. PPE, Check with your community leaders about pesticide licensing requirements.
31. Russian Olives: Invasive
	1. How to control volunteer trees in communities. Cut stump and dump 50% mixture of diesel fuel and stump killer: Remedy, Garlon, retreat any new shoots.
32. Wind damage: Co-dominance, tight crotches, included bark are weak attachments
	1. Winter desiccation: ‘Wilt-Pruf’ or other Anti-Desiccant sprays
	2. Windbreaks and shelter belts: information online
33. Miscellaneous:
	1. Spacing Guideline Chart: Hedges: proper plant spacing adjacent to rights-of-way, sidewalks, traffic signage/lights, hydrants, line of sight triangle, overhead and underground utilities, etc.
	2. Arborvitae: Deer browse