How "Climate-Smart" are the City of Ashland's
2017 Climate and Energy Action and 2016 Ashland Forest Plans
December 31, 2020

The purpose of this review is to evaluate two City of Ashland plans officially ripe for updating: the 2017 Climate and Energy Action and the 2016 Ashland Forest Plans.

The City of Ashland is rightfully heralded as a progressive, intelligent, and "environmentally aware" community that takes bold actions to protect diversity, citizen welfare, and the local environment. The Ashland Forest Resiliency Project and similar initiatives have contributed to this reputation.

I chose to move to Ashland in late 2016 after a 35-year career in the National Park Service and Bureau of Land Management because of the City's reputation and natural amenities. In April 2019, I became a commissioner on the Ashland Wildfire Safety Commission because of my expertise in natural resources and fire management. In September 2019, I co-founded the Southwestern Oregon Climate-Smart (SOCS) Working Group with individuals from regional climate and natural resource conservation organizations to enable climate-smart natural resources management as a common practice in Southwestern Oregon.

An early version of these review comments was sent to City Council Member, Tonya Graham, in June 2020 because of her professional expertise in the subject matter and her role as an elected official. She provided no feedback. In December 2020, a version of this document was provided to Marty Main (Small Woodlands, Inc) and Chris Chambers (Ashland Fire & Rescue) for review and comment on Part III. This version reflects their input and corrections to errors they noted. Unless otherwise indicated, however, the perspectives presented are my own and, therefore, may or may not reflect those of the two reviewers.

This report is intended for consideration by three city commissions who have advisory responsibilities in the subject matter: Climate Policy Commission; Conservation and Climate Outreach Commission; and Forest Lands Commission. City Councilors and other city commissions could have an interest in and benefit from the information and perspectives provided, but the three city commissions listed have historically played a key role in the development of one or both plans.

As a private citizen, I invite interested City Councilors and members of relevant City Commissions to respond to this review by contacting me directly through email (charsyd3@gmail.com) or by mobile phone/text (505-309-8011). I would be honored to contribute in an appropriate manner to updating the 2017 Climate and Energy Action Plan and the 2016 Ashland Forest Plan. I am particularly interested in engaging with the City of Ashland and others to facilitate public dialog that leads to Ashland becoming a "climate-smart" fire-adapted community.

Charisse Sydoriak
December 31, 2020

This document is divided into three parts:

1) introduction to key terms and concepts in the "climate-smart" approach;
2) assessment of the "climate-smartness" of the 2017 Climate and Energy Action Plan (CEAP); and
3) assessment of the climate-smartness" of the 2016 Ashland Forest Plan (AFP).

I. Introduction to the "Climate-Smart" Approach

My review of Ashland's Climate and Energy Action Plan (CEAP) in Part II of this document examines how well the CEAP addresses key characteristics of ***"climate-smart"*** adaptation as defined in this section. My review of the Ashland Forest Pan (AFP) examines the four ***"usual"*** climate change adaptation planning content topics (listed below), and--where it makes sense to do so—explores how key characteristics of the "climate-smart" approach are integrated into goals, objectives, and planned activities.

The "Usual" Climate Change Plan Content Topics
Most current management plans that claim to have addressed climate change contain one or all of the following:

1) Acknowledgement that climate change is an issue and a summary of projected concerns based on science publications. (Both the CEAP and AFP devote a chapter to outlining potential impacts of climate change. The CEAP also provides a detailed "Climate Trends Summary" in Appendix A.)
2) Provide goals/objectives based on past conditions, resisting change, and promotion of "resilience."
3) Identify mitigation strategies designed to limit or reduce carbon emissions.
4) Prescribe change adaptation strategies and tactics based on historic conditions and actions planned are commonly accepted or customary management practices.

The "usual" climate change plan content topics do not make a "climate-smart" plan but they set the stage for in-depth vulnerability assessments that support forward-looking decision-making. To be fully "climate-smart," a climate change adaptation plan should include a robust analysis of objectives relative to vulnerabilities given uncertain and novel future conditions. The results of these analyses are clearly presented to promote transparent public engagement and better-informed adaptation option decisions in the face of uncertainty. When stakeholders find out that it may be impossible to preserve and protect cherished resources and services, they are more likely to engage in and support critical change management transitions.

What Makes a Climate Change Plan Climate-Smart?

As used in this document, a "climate-smart" plan should deliberately link current and forecasted climate change to proposed change adaptation actions. Being "climate-smart" means INTENTIONALLY making a transition from a paradigm of protection and restoration (resisting change), to one that is open to anticipating and actively managing for endurable change. The challenge is to manage for desired outcomes, with uncertainty clearly in mind, and to enable public understanding of this need.

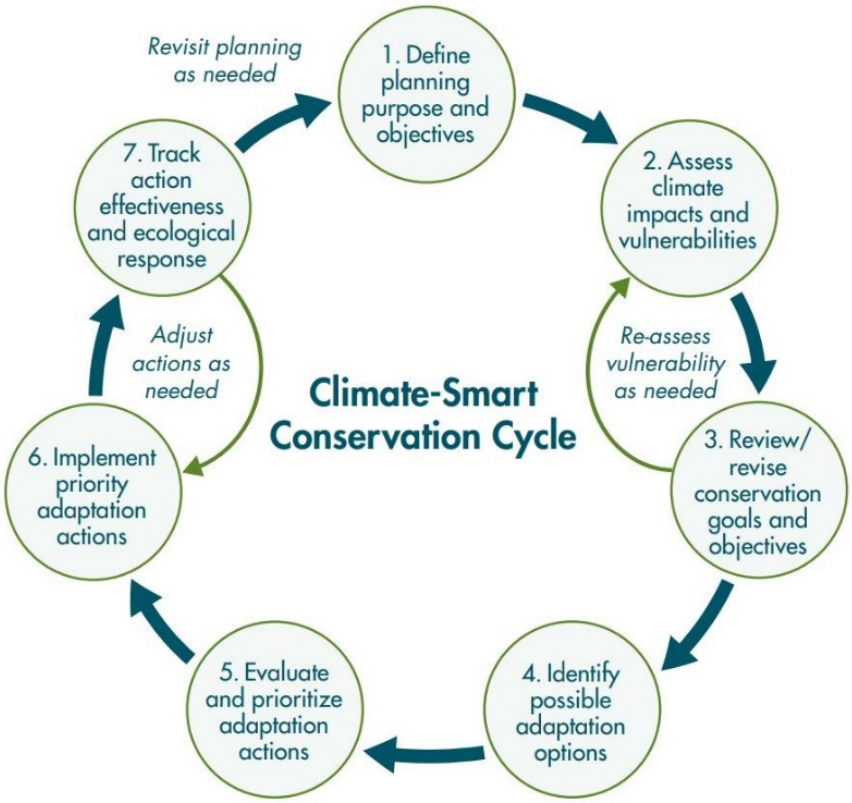
Key characteristics of the climate-smart conservation/adaptation approach[1] are:

- ✓ **Linking actions to climate impacts.** Strategies and actions are designed specifically to address the impact of climate change in concert with existing threats. Actions are supported by an explicit scientific rationale and understanding of potential climate vulnerabilities.

[1] Adapted from the key characteristics described in "Climate-Smart Conservation: Putting Adaptation Principles into Practice" (www.nwf.org/ClimateSmartGuide). Note that while the process focus is in on natural resources conservation, the concepts are broadly applicable change adaptation options.

- ✓ **Embrace forward-looking goals**. Adaptation goals focus on future, rather than past conditions. Strategies take a long view (decades to centuries) but account for near-term challenges and needed transition tactics.
- ✓ **Consider broader landscape context.** On-the-ground actions are designed in the context of broader geographic scales to account for likely shifts in species distributions, to sustain ecological processes, and to promote collaboration.
- ✓ **Adopt strategies robust to uncertainty.** Strategies and actions ideally provide benefit across a range of possible future conditions to account for uncertainties in future climatic conditions, and in ecological and human responses to climate shifts.
- ✓ **Employ agile and informed management.** Natural resources managers and the public are capable of continuous learning and dynamic adjustment to accommodate uncertainty, take advantage of new knowledge, and cope with rapid shifts in climatic, ecological, and socioeconomic conditions.
- ✓ **Minimize carbon footprint.** Adopt strategies that minimize energy use & greenhouse gas emissions and employ tactics that enable systems to naturally cycle, sequester, and store carbon.
- ✓ **Account for climate influence on project success.** Monitor the results of actions taken. Avoid investing effort likely to be undermined by climate-related changes unless part of an intentional strategy.
- ✓ **Safeguard people and nature.** Adopt strategies and tactics that enhance ecosystems' capacity to protect human communities and co-beneficial biota from injurious climate change impacts.
- ✓ **Avoid maladaptation.** Take care not to exacerbate human/climate-related vulnerabilities or undermine conservation goals and broader ecosystem sustainability.

Figure 1. Climate-Smart Conservation Cycle.



There are several change adaptation planning approaches and decision support tools to choose from. The "climate-smart conservation" approach highlighted in this paper was developed by a consortium of contributors led by the National Wildlife Federation in 2013-14.

The "climate-smart conservation cycle" shown in Figure 1 and described in detail in Stein et al (2014) is grounded in proven strategic planning models but has been modified to facilitate explicit and transparent consideration of uncertain future conditions and potential consequences. Relevant science is relied on to inform the adaptation planning process and to define the geographic scope and timing for proposed activities. To link socioeconomic concerns, stakeholder engagement is emphasized. To fully appreciate this adaptation approach, I highly recommend studying every chapter of the 2014 Climate-Smart Conservation Guide. It is thorough, well-written, and supported by useful graphics and references. Many case studies are provided to facilitate framing of resource conservation issues and problem solving.

II. How Climate-Smart is the 2016 Ashland Climate and Energy Action Plan?

Do the Goals, Objectives, Strategies, and Actions deliberately:

✓ Link actions to climate impacts?

Appendix A provides a good discussion on relatively recent change metrics in Ashland and the Rogue Valley and the science that supports climate change concerns. Values-at-risk are broadly identified relative to the community, such as: flooding, drought, fire, changing precipitations patterns, and water availability. Plants and animals are mentioned as being "positively and negatively affected."

Finding: "Priority actions" associated with each strategy are linked to on-going and anticipated climate impacts in the CEAP Implementation Plan. The projections of future climate conditions needs to be updated based on the latest scientific information.

✓ Embrace forward-looking goals?

The CEAP (page 10) provides two "forward-looking" goals: 1) reduce the community's contributions to greenhouse gas emissions, and 2) prepare the "city's communities, systems, and resources to be more resilient to climate change impacts."

The overarching strategic initiatives on pages 10-11 guides the City's proposed actions. Measurable objectives that map a clear path to achieve stated goals are not provided. Instead, the "plan presents goals, targets, strategies, and potential actions for mitigating and adapting to climate change." Strategies, targets and actions are subdivided into six focus areas. "Priority actions" are identified and assigned to City Departments as "responsible parties." The structure is described as "a framework for launching the [initial] implementation phase of the plan." As the Plan is implemented, "…more specific quantitative goals and milestones will be created…."

Findings: The CEAP presents two goals that intentionally create "mitigation" and "climate adaptation" foci and a useful roadmap for implementation.

One of four "climate-smart" themes is the need to routinely reconsider goals and objectives, and then adjust management strategies as we learn that current goals and objectives may no longer be feasible or are maladapted. Ideally this discovery is made far enough in advance to provide opportunities to make course adjustments. Since the CEAP is based on a continuous learning paradigm, revisions are supposed to occur every three years and there is a built-in success monitoring plan included--there should be frequent opportunity to re-evaluate goals, objectives, and strategies. The challenge is doing what is prescribed in the time specified, particularly because the COVID-19 pandemic has interrupted City business and public engagement is seriously constrained.

✓ Consider broader context?

Climate change is identified as an "economic, social, and environmental" issue in the CEAP (page 14).

"The City of Ashland works within its city limits and with partners outside its limits to promote sustainable management and conservation of its natural ecosystems." (CEAP page 83).

Two references to climate model outputs are identified to provide the reader with a broad geographic sense of potential climate change impacts (e.g., temperature increase) on forests and relative to wildfire risk (Sheehan et al. (2015), et al. and GEOS Institute (2016)).

The GEOS Institute published a "Climate Change Vulnerability Assessment for Ashland and the Rogue Valley 2016" (Assessment) in September 2016, about 6 months before the CEAP was published. The Assessment covered natural systems and socioeconomic vulnerabilities. A suite of potential strategies was suggested in response to the vulnerabilities identified. Some City staff participated in the workshops that informed the Assessment.

Findings: The City clearly appreciates the need to consider ongoing and potential socioeconomic and environmental climate change driven impacts in a broader context. It consulted with climate change scientists and adaptation specialists to develop a geospatial perspective. The CEAP discussion and references demonstrate a commendable effort to reach out and avoid insularity.

Since I did not participate in the Assessment process, I cannot know the extent of effort and thought that went into integrating the results into the CEAP. This review, therefore, is based entirely on the documents discovered by me in the process of the review. This means that my findings may be flawed. It is hoped, however, that because I was not part of the exercises, my "outsider" reaction may have value in pointing out topics that were not adequately covered.

One of the topics that appears weakly connected is climate change "exposure" potential from a geospatial perspective. The Nature Conservancy, US Forest Service, and other land and resources management organizations have also published similar downscaled geospatial exposure graphics for southern Oregon and the Rogue Valley, but integration of downscaled results into action plans seems superficial. This is a short-coming of all climate change response plans I have reviewed for the Rogue Valley.

✓ Adopt strategies robust to uncertainty?

Customary management strategies and tactics should not be presumed to be the preferred course of action except in localized situations where success is nearly certain to be attained. While these management activities remain applicable, they are likely to be inadequate for the long term. The CEAP identifies both customary strategies AND suggests new approaches that are likely to be more robust in the long-term.

One of the many strengths of the CEAP is that it contains (page 26) definitions for key terms and concepts critical to preparing for an uncertain future climatic regime:

> "Strategies and actions focused on changing behavior, land use, and environmental management to prepare, protect, and build resilience of infrastructure, ecosystems, public health, and quality of life to anticipated effects of climate change. **Although used interchangeably in this plan, there are slight differences between climate adaptation and resilience.** The strategies in this plan address both climate adaptation and resilience.
>
> **Adaptation** refers to action to prepare for and adjust to new conditions, thereby reducing harm or taking advantage of new opportunities.
>
> **Resilience** refers to the capacity of a social or ecological system to continue to function despite disturbances."

(Bolding has been added above to point out key terms and how they were handled).

The term "resilience" is tricky because it has multiple definitions—most referencing a return to a former state of being after injury or other difficulty. There can be no return to the status quo or historic option in a no-analog future. In the CEAP, the definition does not reference returning to a former state and the phrase--"continue to function"--acknowledges that the desired future condition must be robust to continuous change. The issue I have is relatively minor but worth bringing up to refine perspective.

"Disturbances" in the mind of the lay public are generally considered "bad" and, therefore, unwanted. In ecological systems, "disturbances" caused by naturally occurring fires, periodic flooding, landslides, etc. are natural processes that recycle nutrients, shape the environment, and enable renewal. While humans are inconvenienced by these processes and--may be the causative factor, the "disturbances" are not inherently "bad." Perhaps an alternative definition for the concept of resilience is the ability to "adjust easily to and continue to function despite rapid change and uncertain future conditions." By removing the word "disturbance" and simply acknowledging change, no value judgements are imposed.

Managing for the "**persistence**" of a valued resource can be a useful replacement term in certain circumstances. If the goal is to enable a valued resource or system to persist in a relatively similar configuration, such as the amount of water available in Reeder Reservoir, even though the future will be much warmer and snowpack less reliable, it is important to deliberately articulate goals, objectives and strategies that are intended to manage for the persistence of an asset as opposed to managing for "resilience."

Change "**resistance**" strategies buy us time for more in-depth studies, experimentation, and planning. They should not be considered as the best or only solutions. Bold questioning of assumptions is critical, as is continuous experimentation and monitoring to validate implementation choices made. To rely on customary management practices too much for too long could be maladapted. The climate-smart approach calls for deliberate questioning of management practices, exploration of alternatives, and experimental application of a range of strategies and tactics across space and time. In my opinion, we need to experiment with "every tool in the box" and avoid shying from novel approaches.

✓ Employ agile and informed management?

The CEAP (page 14) "represents the beginning of an ongoing and evolving process." The intent is to "…every three years…ensure that the city's actions toward addressing climate change are up-to-date…." (page 14). This evaluative process (page 110) will "ensure…plan strategies and actions reflect the latest knowledge and best practices around climate mitigation and adaptation." Further, "[p]rogress toward meeting CEAP targets and goals will be evaluated and tracked on an action-by-action basis with an overall progress report for all actions and activities provided on at least an annual basis. If possible, qualitative updates will be available on a quarterly basis."

Finding: Assuming that the City can routinely track progress and report results (at least annually) and make adjustments based on the "latest knowledge and best practices", the "informed management" key characteristic criteria will be met.

Unfortunately, all institutions struggle with "agility." Being climate-smart requires nimble paradigm shifts that embrace flexibility and experimentation as the norm. Since humans tend to be suspicious and critical of change particularly in a governance context, the key will be active citizen engagement through education and dialog. Ashland's interests are often hotly debated in the public arena. To gain support for the types of actions proposed, the City must address a serious problem—the communications and outreach director duties must be redefined and the position filled asap. As the City may not be able to permanently fill this professional position soon because of general fund losses, the City's ability to educate and gain public support is a serious concern. Ashland's ability to motivate transformative change due to lack of coordinated interactive communications with its citizens and interdepartmentally could be a serious impediment to accomplishing CEAP goals.

✓ Minimize carbon footprint?

Mitigating emissions is one of the key characteristics of a climate-smart approach. Happily, a primary focus of the CEAP is to reduce greenhouse gas emissions, and planned emissions reduction strategies are relatively well covered.

Findings: Unhappily, the 8% per year emissions reduction target (page 10) is not being met. When the CEAP is updated, it would be helpful to know more about why achieving this target has been elusive. The emissions reduction implement plan could be strengthened by discussing every priority action's ability to self-regulate to minimize carbon emissions.

✓ Account for climate influence on project success?

The Plan contains a Monitoring and Evaluation Plan (pages 110-114) which outlines the monitoring process for key indicators of project success.

Finding: The monitoring and evaluation plan is relatively strong. A key question is whether the City has the capacity to collect and process the data routinely to support nimble decision-making based on continuously shifting environmental and socioeconomic conditions (e.g., COVID-19 pandemic).

✓ Safeguard people and nature?

The CEAP identifies public health, safety, and welfare as one of six focus areas. Current conditions and future issues are detailed as are projected concerns based on climatic change. Priority actions linked to projected climate impacts are incorporated into the implementation plan.

The first priority action in the Natural Systems strategy (page 84) calls for managing forests in a manner that safeguards "…ecosystem function and services" using "best available science to inform fire management and planning to manage ecosystem health, community safety, and carbon storage."

Finding: The CEAP considers safeguarding people and nature.

✓ Avoid maladaptation?

With few exceptions, its difficult to identify potential maladapted actions in the CEAP because the proposed actions lack specificity. The authors of the Plan understand the issues and have prescribed climate-smart strategies. Maladaptation is most likely to occur during project planning and implementation which the CEAP is not designed to address.

To prevent maladapted actions, the human actors need to be educated and planned actions coordinated. Fortunately, in the "Cross-Cutting Strategy" Implementation Plan, the City commits (page 100) to "incorporat[ing] climate change considerations into all that we do." Goals and indicators are provided to facilitate. Four strategies, two of which focus on education and communications, and two which focus on policy and governance lay out priority actions that promote coordinated change. For example, on page 103 the CEAP states: "[i]nclude consideration of climate action goals within the scope of every appropriate City Advisory Commission."

Findings: The CEAP prescribes strategies and actions that should go far in preventing unintended maladapted activities. The Plan requires educating stakeholders and staff, and a commitment to shift policy and governance to routinely consider climate change mitigation and adaptation.

The challenge is realizing these activities given that there is no City Communications Director to promote the communications proposed and public engagement will be extremely constrained for several years until a COVID-19 vaccine is produced and administered. Some City Commissions have not yet been tasked with integrating the tenets of the CEAP even though it was released three years ago.

Based on the best available science, we know that some activities intended to enable certain ecosystems to persist may be maladapted in the near and longer-term. Well-intended natural resource "restoration" activities usually have a temporary stabilizing effect that "buys us time" to come up with more robust climate change solutions. While restoration of ecological function and structure are essential to enable ecosystems to persist, the composition and distribution of ecosystems is changing. This means that

restoration and preservation of existing plant associations may be a costly maladaptation. We can be optimist that current management practices are helping ecosystems survive at least for the near term, but customary practices intended to "restore the natural range of variability" are potentially maladapted. More on this topic is discussed in the review of the Ashland Forest Plan.

Summary Findings and Recommendations for the CEAP Update

Ashland's Phase I CEAP is a relatively climate-smart roadmap for the City of Ashland. Proposed actions are linked to projected climate impacts, existing threats, and supported by scientific rationale. The links to priority actions are general and not specific which is to be expected in this phase.

The CEAP is logically organized and graphically beautiful. All key characteristics of a climate-smart approach are present. The prioritization and organization of the strategies and actions in a clear and color-coded framework enables the reader to focus on topics of interest. "Potential indicators" to measure progress are provided.

The CEAP needs to focus more on managing for change (adaptation options). The next generation of the CEAP should take a deep dive into uncertain, yet plausible future environmental, social, and economic conditions to better anticipate a spectrum of vulnerabilities and risks. The 2016 Ashland and Rogue Valley Vulnerability Assessment (GEOS 2016) provides substantial (though somewhat dated) information to start a deep dive approach. A deep exploration of vulnerabilities and risks could facilitate the development of more climate adaptation options. The Climate-Smart Conservation Guide (Stein et al. 2014) provides a suite of tools to help identify, select, and implement adaptation options

A facilitated scenario planning exercise would bring a "new lens" to framing where, when, how, and more importantly "why" strategies and actions are prescribed across the landscape. Envisioning and learning about potential consequences of major (even novel) environmental <u>and</u> socioeconomic shifts can best be understood by imagining a suite of plausible futures as a group exercise. Scenario planning exercises can transform understanding and enable us to anticipate and prepare more effectively for uncertain socioeconomic and climatic conditions. The results may well validate the CEAP goals, but the strategic framework of priority actions will likely be revised to support more climate adaptation activities.

Decision-support tools can be helpful for transitioning the results of scenario exercises to revised goals, objectives, strategies, and tactics robust to uncertainty. If a decision-support tools is used, assumptions need to be identified and the decision path mapped out in the Plan.

(This review of the CEAP was completed in July 2020).

III. How Climate-Smart is the 2016 Ashland Forest Plan?

The Ashland Forest Plan (AFP) prescribes management treatments for roughly a 1,100-acre forested area owned and managed by the City of Ashland within the Ashland Creek Watershed (Watershed). The upper Watershed is administered by the US Forest Service through the Ashland Forest Resiliency (AFR) Project which was launched in 2004. Active treatment of City lands within the Watershed started about 15 years before the AFR Project was initiated. Forest management practices are coordinated for AFP and AFR projects to meet the objectives of both. Substantial work in the Watershed has been accomplished since 1989 to reduce fire risk and reduce tree densification resulting from more than a 100 years of fire exclusion. These accomplishments have improved the overall health of the forests.

Ashland's Climate and Energy Action Plan (CEAP) refers to the 2016 Ashland Forest Plan (AFP) as one of the "initial steps" that the City has taken to address climate change. Indeed, ~25 years of forest thinning and prescribed fires (tactics that "take into account the important role of forests in a changing climate"), have created conditions that reduce the vulnerability of these forests to climate change in the short-term.

Unfortunately, these tactics designed to restore "the natural range of variability" may be inadequate--except in limited areas--to protect these forests for the long-term. Ecosystems can no longer be preserved or restored to some sort of "pristine condition" due to the rapidity of climate change and extreme reach of human influence. Addressing growing threats brought about or accentuated by rapid climatic change requires a fundamental shift in expectations and the practice of natural resource management and conservation. Forward-looking goals/objectives and adaptation strategies and tactics are often inadequately dealt with in land and resources management plans because "historic conditions"—even after known ecosystem imbalances are corrected—are overtly or indirectly the "target" future condition.

Fortunately, the City of Ashland recognizes the urgent need to revisit the goals, objectives, strategies, and desired target conditions for the City managed portions of the Watershed through a "climate-smart" lens. I offer the following observations to facilitate construction of that "lens."

1) <u>General Introduction to the Climate Change Challenge:</u>
The purpose of the 2016 AFP was to reflect on whether past activities were moving desired outcomes in the right direction. Unless/until an alteration in course is deemed necessary based on effectiveness monitoring data, the established strategies (grounded in "restoring the natural range of variability" to create "resilience") has been determined to be the best course of action. A tree mortality survey completed in 2020 (Main and Schmidt) revealed some changes in forest demographics that suggest that climate change should be more directly considered in the AFP. Based on these findings, Chambers and Main began the process of updating the AFP in 2020. (Chambers pers comm. 12/2020).

I recommend that as the updating progresses, the AFP authors consistently incorporate "climate-smart" adaptation language, principles, issues, and planning tools identified in the Climate-Smart Conservation Guide (Stein et al., 2014). The review comments that I provide in this review are designed to point out issues I found that can be resolved by adopting the "climate-smart" approach.

The 2016 AFP devotes a chapter to the topic of climate change. The opening paragraph is "climate-smart" in that it emphasizes the need to act in spite of the fact that projections of the future climate is an "emerging science", and there is a "high level of uncertainty" about the potential scope, timing, and effects on forest ecosystems and human values; and "opportunities for adaptation of management strategies to accommodate [climate-driven] changes is a new and unsettled field of study." It further states (page 53) that "most frameworks for present and future management suggest flexible approaches, ongoing monitoring, learning, and subsequent adaptive management."

The AFP (page 55) also "recognizes that we should not rely on past forest climate conditions and assume a steady weather regime to provide us with adequate targets for current and future management." And on page 53, "[i]mportant changes in forest and resource management strategies will have to occur on a much larger spatial and temporal scale than addressed in this 2016 Ashland Forest Plan (AFP)."

These statements indicate significant understanding of the complexities associated with managing for healthy forests in the face of unprecedented climatic change. The composition, structure, and ecosystem functionality of forests and associated biota in the Ashland Watershed and adjacent lands is changing and will change substantially more as many plants and animals experience physiological thresholds they may not survive and extreme weather and fire events alter ecosystem composition, structure, and function.

Since the future climate will be dominated by higher average temperature, and altered precipitation patterns, forms, and amounts, it is important to present a new forest management plan that closely examines and deliberately tackles these variables despite uncertainty. According to Chris Chambers (Ashland's Wildfire Division Chief), the 2016 AFP was designed to establish high level direction and strategies to meet generalized objectives. Historically, area-specific tactical "restoration" plans and unit specific treatments tiered off the AFP. The next version of the AFP should take advantage of significant advances in climate adaptation planning frameworks, science-informed species vulnerability assessments, and decision-support tools that were not available when the 2016 AFP was drafted.

2) <u>Change "Resistance" and "Resilience" Solutions</u>

On page 53, in Chapter 5 of the AFP, the climate change adaptation challenge is described as: "The City will be challenged to integrate adaptive strategies that help ecosystems accommodate climate changes over time while encouraging mitigation strategies in our own jurisdictions that can help reduce human-caused influences on global climate. Adaptive strategies include *resistance options* (delay the impacts and protect highly-valued resources), *resilience options* (improve the capacity of ecosystems to return to desired conditions after disturbance), and *response options* (expedite transition of ecosystems from current to new conditions)." A climate-smart approach would "show your work" to demonstrate that a suite of options such as those described were systematically considered. The 2016 AFP does not do this. Based on the text on page 53, it appears that the City of Ashland has elected to adopt the "resilience" option which is described as "improv[ing] the capacity of ecosystems to return to desired conditions after disturbance." The desired conditions are not clearly described so it is not possible to judge the efficacy of the target relative to planned actions. The 2016 AFP also states that "…management objectives and implementation strategies initiated over 20 years ago on City lands will continue to have climate-change relevance under the 2016 AFP, and contribute to the larger landscape's ability to adjust to future variability in temperature and precipitation." In other words, forest health restoration objectives and customary techniques (considered highly progressive at the time) are implied to be adequate to prepare for the future.

Unfortunately, the "natural range of variability" for the existing complement of species is unlikely to remain viable in certain areas. The dynamics associated with species composition and potential realignment is complex. Fortunately, shifting species composition has been a consideration since treatment prescriptions were first drafted in 1996 (Main pers comm. 12/2020). Recent investigations by Main and Schmidt (2020) have suggested that persistence of Douglas fir in drier sites at lower elevations is of particular concern in a warming climate regime.

The AFP appears to be employing a "resistance" strategy. The planned actions "buy time" by delaying the potential consequences of climate-driven change on the ecosystem and protecting high value assets to some degree from catastrophic wildfires. Ideally, the AFP would discuss the potential longer-term consequences of "resisting" climate change impacts from both an economic and ecological perspective.

There are exercise frameworks available to facilitate exploration of the consequences of resisting uncertain, yet inevitable change.

"The short-term focus for the City forestlands managed under the 2016 AFP will continue to be on adaptive strategies that improve overall ecosystem resistance and resilience from major perturbations, most notably from high-severity wildfire." (AFP page 54). A clear climate change "response" (proactively prepare to change) option is not provided in the 2016 AFP. Fortunately, the need to rectify this deficiency is recognized as urgent (Main pers comm. 12/2020). The City plans to have a climate change "response" strategy identified in the AFP in 2021 (Chambers pers comm 12/2020)

As demonstrated above, climate change adaptation terminology matters tremendously. Since the climate adaptation field is relatively new, it is important to adopt standards for what is meant by key terms and to insure consistent and appropriate application of terms. The term "resilience" is the most problematic because it can have two widely divergent meanings: a) the <u>ability to return</u> to some past condition after harm; or b) the <u>ability to move forward</u> despite an adverse situation. The public does not yet appreciate the difference. It would be a great dis-service to effectively promote/promise a future that cannot be delivered because of a language problem.

3) <u>Emission Mitigation Discussion</u>

Ashland's greenhouse emissions reduction strategy is the primary focus of the CEAP and therefore not reviewed in this document. The AFP addresses the topic peripherally.

The AFP points out that carbon sequestration in forested ecosystems is "widely thought to be the most efficient terrestrial carbon accumulating system (Millar et al., 2007)." The US Congressional Research Service (CRS) published a report in August 2009 containing information adapted from the Intergovernmental Panel on Climate Change, "*Table 1: Global carbon stocks in vegetation and carbon pools down to a depth of 1 m [meter]," Summary for Policymakers: Land Use, Land-Use Change, and Forestry. A Special Report of the Intergovernmental Panel on Climate Change, at http://www.ipcc.ch/pub/srlulucf-e.pdf, p. 4.* The CRS report summarized the IPCC findings in a Table that says an average of 68 tons per acre are stored in the temperate forest biome. The average tons per acre stored in temperate grasslands is 108 and in the wetland biome it is 308 tons/acre. These findings bring to question the statement that forests are "the most efficient terrestrial carbon accumulating system." According to the IPCC report, wetlands and temperate grasslands are significantly more efficient at sequestering carbon.

Based on these findings, it may be prudent to change the focus of the conversation. The forest carbon storage debate is heated because of historically unpopular and unsustainable forest harvesting practices that removed "old growth" forests. There is no doubt that the temperate forest biome sequesters carbon, but other biomes present in this region are potentially nearly or even more important for carbon sequestration. The extent of forested lands in Oregon makes the forest biome important here, but if forests are thinned, it isn't necessarily catastrophic relative to carbon sequestration. The real issue appears to be maintaining soil health and preventing severe fires that damage soils and remove extensive areas of vegetative cover (particularly critical on decomposed granite in a municipal watershed).

There is concern, however, that the prescribed actions in the AFP are inadequate to mitigate massive carbon emissions from spatially extensive and uncharacteristically severe fire behavior, such as Oregon experienced in 2020. While the City did a commendable job of bringing the public on board for the 2016 AFP, more aggressive thinning and prescribed fires are required as is public outreach and education to increase public tolerance of smoke. Ashland's forest lands managers agree and have worked hard to enabling more liberal prescribed fire smoke regulation policies in the State. Unfortunately, much more needs to be done. The question that should be deeply explored in the AFP (through massive public

engagement) is what more can be done to enable the public to embrace fire (and smoke) in the face of climate change as an essential and ordinary part of living in the Rogue Valley?

4) Climate Adaptation Strategies Discussion

A primary goal for Ashland's forested lands is to manage for persistence of the forests and a productive watershed through application of resistance and resilience strategies. Tactics such as reducing fuels and tree densities, protecting "legacy" trees, and restoring natural processes (e.g., fire) are appropriate activities that improve forest health in many temperate forest ecosystems because thinning reduces competition for limited resources like water.

Since deliberate linking of current and planned actions and forecasted climate impacts--a key characteristic of climate-smart adaptation planning--was not clearly made in the AFP, I make a preliminary attempt with the AFP management objectives listed on pages 53-54 below:

Climate Adaptation "**Resilience and Resistance"** Objectives:

- "Reducing the likelihood of high-severity fire through strategically placed fuels treatments and subsequent implementation of prescribed underburning to maintain reduced fuels and less fire-prone conditions"
- "Managing for both growth and maintenance of older forests that may sequester and retain large amounts of carbon over time"
- Monitoring and control of invasive plant species that are prone to establishment and/or expansion in changing climates"

Potential **"Response"** Objectives*:

- "Focusing on protection and restoration of diverse forest structures, plant communities and associated genetic resources which are important mechanisms of resilience"
- "Emphasizing multiple tree species management including species well selected to thrive in future warmer and drier conditions such as pines, hardwoods and shrub species (within prescribed spatial considerations for their potential to aggravate fire potential and hazard)"

*The "response" objectives listed above are tactics as stated but can loosely be described as "forward-looking." More specificity would be helpful. Species selection in a changing climate needs to be linked to topographic variables (e.g., position, aspect, elevation, slope) which is implied, but deductive work is not shown in the AFP. This means that the reader has no way of knowing why, what, where, and how the managing for change paradigm, not just persistence ("response" option) will occur. The AFP acknowledges the need for geospatial and species-specific assessments and targeted prescriptions, but the reader has limited access to the Global Climate Models (GCM) used in forecasting future conditions, GCM limitations considered by the planners, and environmental variables considered and rejected by the AFP authors. The next version of the AFP needs to provide this information to demonstrate how and why "response" options will be implemented.

The AFP states on page 54 that prescribed activities are "short-term" with the intent of improving "overall ecosystem resistance and resilience from major perturbations, most notably from high-severity wildfire." Unfortunately, the AFP does not define what is meant by "short-term," nor does it articulate the long-term consequences of focusing on a short-term approach.

As time passes, the risks of catastrophic outcomes increase and opportunities to adopt and implement effective climate adaptation options may become more limited. The 2016 AFP intentionally deferred integration of vulnerability assessments and risks associated with climate change uncertainty in their goals, objectives, strategies, and prioritization process because the timing wasn't ripe five years ago (Main pers comm. 12/2020). The near- and long-term consequences of further deferral could profoundly

alter the quality of life in Ashland and the ability of our forest lands to provide the services (e.g., reliable water) that supports the community and functionality of watershed ecosystems.

Chapter 9: Vegetation: Retrospective, Trends, and Challenges

Chapter 9 contains a rich discussion of the historic and current "variables and factors" that have shaped vegetative conditions in the Ashland watershed. The role of naturally occurring fires, challenges associated with historic suppression of all types of fires, and recent treatments with prescribed fires in the WUI are covered at length. This discussion is largely retrospective, though a few "trends and challenges" are summarized. The forward-looking climate change perspective is missing in key portions of the AFP. Examples from chapters 9, 10, and 11 follows.

Chapter 9. Vegetation: Dilemmas and Directions

> *"The key to the preservation of water quality and the other forest resource values within the Ashland Watershed is contingent upon the ability to manage the geographical distribution and intensity of wildfires that will occur within the watershed." (page 105)*

Given this and other text about management "dilemmas" in the project area, there needs to be a deliberate discussion of climate change driven dilemmas. To develop an appreciation of climate change dilemmas, a suite of climate related questions should be asked. Here are a few that I suggest be addressed in the update of the 2016 AFP:

- Where in the Ashland managed forests (and USFS managed lands) within the Watershed are resource values and species at greatest risk given projected future conditions that are much hotter and drier, somewhat hotter and much wetter, much hotter and wetter, etc.?
- What species are likely be lost or significantly reduced in a changing climate and what is the latest scientific basis for this determination? Where are the likely refugia for socioeconomically important and sensitive species? Where are the connectivity corridors in the planning area for mobile species? Will projected changes enable them to move in time? Do they have viable habitat to move to?
- How vulnerable are the current species of value to climatic change driven increases in forest insects and disease resulting in yet another possible form of high severity disturbance?
- Are there other species better adapted to a much warmer future that would be better suited to meeting management objectives? What is the scientific evidence for this determination?
- What will the City do if the forests are largely killed in a wildfire or major insect/disease event?
- Given geospatial data layers with this kind of information for all values, including fish, wildlife, riparian ecosystems, wetlands, recreation infrastructure, water supply infrastructure, WUIs, landslide potential, historic fuels treatment areas, fire history, and more, where are there a convergence of concerns and opportunities?
- After examining vulnerabilities under a range of forecasted, yet plausible climatic and sociopolitical and economic change scenarios, do the results affect the validity of the AFP's goals and objectives?

Until responses to these questions are developed, it is not possible to fully expose vegetation management dilemmas. Selection of adaptation options to address identified dilemmas cannot be fully considered until a comprehensive forward-looking view is framed for public debate. The framing process should be performed through vulnerability assessments, geospatial analyses, and alternative options scoping tools.

A significant climate change dilemma that should be covered in the update is the fact that the 1,100-acres of City of Ashland managed lands is embedded in the lower reach of the Watershed. Ideally private properties and USFS administered areas within the Watershed would be assessed and managed as a whole to meet shared climate-smart goals. Since a holistic adaptive management approach is unlikely to occur

for many reasons (including USFS planning cycles), the updated AFP will likely have to rely on its rich microsite dataset to design a limited range of experimental climate-adapted "response" prescriptions for a relatively tiny area. The potential consequences of this limitation is the dilemma begging discussion.

Chapter 10. Monitoring: Plots and Protocols

> *"Monitoring provides information to help determine if management actions are meeting the objectives of the Ashland Forest Plan. The monitoring plan is designed to do the following:*
>
> - *Track ecosystem elements that are likely to change as a result of management actions including tree vigor, ground layer vegetation, species composition, and soil cover*
> - *Compare effects of treatments at different locations*
> - *Ensure that the desired effects are produced*
> - *Provide feedback on the effectiveness of our individual actions so we can respond in an adaptive management framework"* (Page 110)
>
> *"A proficient monitoring process will continue to provide information to shape the improvement of both planning and implementation of future work on City of Ashland forestlands. These monitoring protocols will offer an ongoing assessment of the 2016 AFP's overall effectiveness. With new information and ecological understandings that result from good monitoring, necessary adjustments to planned activities will occur in the ongoing spirit of adaptive management."* (Page 125)

The City's forest lands monitoring database is extraordinarily valuable, and unique in its documentation, both qualitatively and quantitatively, of changes over the past 25 years. It has served the community well as a tool for adaptive management and should be a strong foundation for climate-smart adaptation planning. Further trend analyses such as the May 2020 tree mortality report (Main and Schmidt) could reveal additional evidence of climate induced changes on City lands. "Even though we are extremely challenged knowing where we are going with climate change, our understandings of how these ecosystems have worked to date [based on 25 years of data], under a range of scenarios, is invaluable." (Main pers comm. 12/2020).
The AFP monitoring plan is designed to track "the result of management actions…." as is shown in the yellow highlighted text. The high level strategic "adaptive management framework" mentioned was not designed to be tactical so it may not be possible to determine if, when, why, where, or how climate change influenced the "effectiveness of individual actions…." Hopefully, climate influence can be teased out of the data to some degree to better inform the updated AFP.

In the past, we often assumed that baseline or reference conditions, against which project effectiveness was measured would remain a reliable constant. This is no longer an appropriate assumption under an accelerated climate change regime (Milly et al. 2008). Conclusions drawn, therefore, based on a management action lens alone could be misinterpreted. If reasonably cost effective, the updated AFP monitoring plan design should be revised to account for climate change as an equally important ecosystem structure and function change agent.

Chapter 11. Forest Management: Goals and Guidelines

Ecological [Goals]

- *"Promote healthy, resilient forest ecosystems including appropriate native plant and animal habitat.*
- *Significantly diminish the likelihood of a high-severity wildfire through active vegetation and fuels management that emulates the historic range of natural disturbances.*
- *We acknowledge that fire will occur on City lands in the future and that our management efforts are designed to allow it to occur at times, locations, scales and intensities that more closely meet current resource objectives."* (Page 126)

Which "native plants and animals" (identified in bullet 1 above) are appropriate and why? As the climate changes, some species will not survive or be greatly reduced in the planning area.

As the pace of climate change has increased, relying on "historic range of natural disturbances" (mentioned in bullet 2), including prehistoric and historic Native American burning practices, is no longer sufficient as a benchmark for management direction. Indeed, in the words of Milly et al. (2008) "stationarity is dead." The dramatic and rapid changes in climate we are now experiencing compels us to rethink long-held natural resource conservation assumptions and strategies. Given this, perhaps bullet 3 should be restated as something like: "Significantly diminish the likelihood of a high-severity fire altering the structure and function of the ecosystems in the planning area." By restating this ecological goal as an outcome instead of including tactics and a commitment to "historic" conditions, the goal becomes climate-smart and management options are broadened.

The third goal is problematic in multiple ways. First, it is not a goal because it describes a strategy or approach. Second, it commits the City to meeting "current resource objectives" when it could embrace enabling changes that are reasonable given uncertain future conditions. Bullet 3 is not a guiding principle but a preferred tactic. Strategies and tactics (prescribed actions) should be stripped out from goal statements and covered separately; they are the means and tools to achieving goals and objectives.

A cautionary reminder, goals and objectives that commit to investing in the long-term persistence of an ecosystem that may collapse or be severely altered may at best be maladapted and at worst foolhardy. (Ashland's forest managers inherently understand this concern so they have invested in fine scale tracking of treatments applied for 25 years at the microscale and continue to modify treatments based on data.)

<u>Chapter 11. Guiding Principles (Page 127)</u>

> *"Restoration projects will be planned to embrace ecosystem health. Thus, management activities will be based on thorough site evaluations, where applicable, by experts in botany, fire ecology, fisheries, fuels, geology, hydrology, silviculture, soils, and wildlife."*
>
> *"Proposed active management and restoration treatments will not be broad brush strokes but site-specific activities based on environmental site conditions including existing vegetation, past management actions, current management objectives, and Desired Future Conditions (DFC)."*
>
> *"Forest management activities will generally be designed to maintain or enhance development of older forest conditions."*
>
> *"Proposed active management and restoration treatments will continue to draw from the mounting volume of data emerging from the monitoring of our own site-work that has been ongoing since 1995. Monitoring and data collection protocols will be continued and broadened to allow for regular and continued adaptive management."*

While several or all of these "guiding principles" are robust to climate change, climate change as an agent of change and the City's response to it should be included as a guiding principle. The new guiding principle could be something as simple as: "To prepare for and adapt to climate change impacts, the City of Ashland will integrate climate-smart conservation principles into its forest management plans and activities."

<u>Chapter 11. Management Basis (Pages 127-128)</u>

> *"Individual units were analyzed for three general characteristics:*
> *• The inherent fire susceptibility of the vegetation in the unit and the benefits of, on a landscape level,*

altering that vegetation to achieve fire management objectives
• Existing stand and vegetation structure, density and/or species composition that was far from desirable and in some cases threatened by insects, disease, and excessively high stand densities
• Site conditions with an inherent high susceptibility for slope failure

In the process of implementing stand management and the use of prescribed fire, the City has been encouraging a change in tree species composition back to one that is more diverse and more representative of historical compositions." (Page 153)

This text describes "three general characteristics" of how individual vegetation management units in the AFP planning area were triaged for treatments. It also reminds the reader that the plan developers value "historical compositions." What is not clear is whether the plan creators looked at climate change driven species vulnerabilities and potential refugia for high value at-risk species. Though not explicitly stated, the net effect of reducing fuels and vegetation density as a strategy has bought the City time to make better informed choices for a no-analog future. It is important that those climate-smart choices be identified as soon as possible.

In the past decade, millions of trees in the Western US have succumbed to stresses associated with climatic change. Western forests are undergoing major compositional, structural, and functional shifts. Assumptions about which species of tree would survive average increases in temperature, alteration of precipitation patterns, and forest insects and diseases have not been accurate in some cases. There have also been surprises, such as the formerly presumed invulnerability of sugar pines, giant sequoia and incense cedar in Sierra mixed-conifer forests. A surge of interest has created a wealth of new scientific knowledge that is relevant to species vulnerabilities and site conditions considered in the AFP.
The latest species vulnerability assessments need to be integrated into the general characteristics considered most important for individual unit treatments. Given uncertainties associated with species vulnerabilities and variable site conditions and experimental design which includes treatments used for the past 25 years, novel treatment options need to be thoroughly explored in the "Vegetation Dilemmas" discussion.

<u>Chapter 11. Adaptive Forest and Resource Management (Page 157)</u>

"The City of Ashland has demonstrated a fundamental commitment to continue its current direction of active forestlands management as described in this 2016 AFP. The ongoing adaptive management that has been in operation since the first Ashland Forest Plan in 1992 has resulted in the following understandings that will guide forest management into the future."

Unfortunately, the "adaptive management" topics resulting in "understandings that will guide forest management into the future" discussion did not include climate change. Important topics that were discussed are wildfire risk, WUI concerns, stand densities, landscape diversity, riparian management, and prescribed fire. The AFP repeatedly states that the plan promotes "adaptive management." It is ironic, therefore, that the "Adaptive Forest and Resources Management" section does not address adapting to climate change as a critical component of the "understandings that will guide forest management into the future." While climate change is not the only consideration, it is rapidly becoming the dominant concern. The drivers of the AFP updating process know this, so I am confident that the updated plan will contain a robust and resourceful discussion on the relevance, means, and urgent need to adapt to a range of plausible future climate conditions.

<u>Chapter 11. Conclusion (Page 160)</u>

"Such an inclusive approach has proven essential in obtaining the political and social acceptance for adaptive forest management designed to achieve mutually agreed upon goals within our City forestlands and beyond."

The Ashland Forest initiative that began in the 1990s was successful because of its inclusive approach to crossing socially accepted norms at the time. The 2016 AFP explores and celebrates past accomplishments as it should. Given this history and a wealth of climate adaptation knowledge and tools now available, the time is ripe to make another bold step—INTENTIONALLY adopt a climate-smart approach to management of Ashland's forested land resources. Based on the social capital and hard-won respect that the project has garnered since its inception, and the consequences of putting off "managing for change," this transition should be embraced as soon as possible.

Chapter 5. Climate Change: Global Yet Local—Conclusion

There are several "climate-smart" statements in Chapter 5 that beg further discussion and physical exploration. For example, the concluding statements:

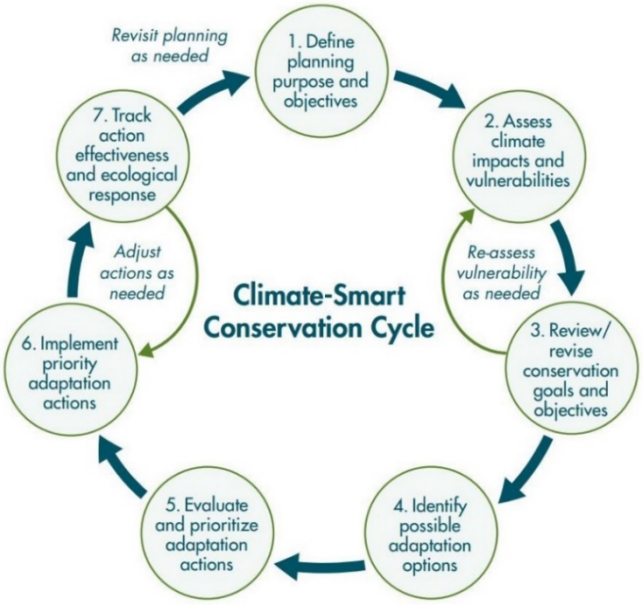
> *"The City forestlands and the conjoined Ashland Watershed are uniquely positioned to test future impacts associated with climate change given the steep environmental gradient and eco-system variation that exists in the eight linear miles from downtown Ashland to the top of Mt. Ashland.*
>
> *Temperature and moisture regimes, which are the key environmental factors that will be modified with climate change exist in a wide variation within this swath of forestland. The naturally occurring differences makes for an ideal location from which to assess changes to individual vegetation and animal species over time and to identify adaptations and make adjustments.*
>
> *The City is in a notable position to monitor changes over time, and perhaps help discern the rate of change and the consequences related to climate change through the continued use and analysis of existing and future data acquired through monitoring on City forestlands. This will help test the effectiveness of existing strategies aimed at improving resistance and resilience of our forests, as well as testing future response options and/or mitigation strategies relative to climate change."*

Based on these concluding statements on page 55 and other information provided in the 2016 AFP, the planning area is physically suited to climate-smart considerations, and for the most part, its downslope residents are sufficiently progressive and "environmentally aware," to support (with adequate education) watershed management activities that have historically been highly controversial.

The 2016 AFP stops short of demonstrating that critical phases and inputs in the Climate-Smart Planning Cycle have been adequately considered. Sooner than later, the City of Ashland should intentionally shift its forested lands management approach (and goals) to a more forward-looking, holistic paradigm. This shift can be accomplished by adopting a framework such as that described in the Climate-Smart Conservation Guide.

Step 2 of the Climate-Smart Conservation Cycle (figure on next page) is critical. It calls for assessing climate impacts on values-at-risk by projecting a range of plausible future conditions at a suitable geospatial scale. I found no evidence that this step was followed through to its necessary conclusion in the AFP. A wealth of knowledge has emerged (e.g., van Mantgem et al., 2009, Holafsky et al., 2020 and Hessberg et al., 2019) and is growing to help us assess climate impacts and the vulnerabilities of values-at-risk. Decision-support systems and tools are also available to facilitate transparent revision of expectations and goals, and integration of existing tactics with new practices that may not have been considered reasonable in the past. Collaboratively developed practical guides, such as the 2014 Climate-Smart Conservation Guide cited in this document, demonstrate how to navigate the process.

A note of caution. The Global Change Models (GCMs) selected for climate change futuring exercises must be used with care. Downscaling vulnerability assessment results to fit the 1,100 City owned acres in the Watershed and surrounding landscape will be very challenging. Nevertheless, it must be done to gain perspective on a range of plausible future conditions that will become the basis for selection of change adaptation options. The tools and techniques ultimately applied and their limitations should be explained in the body of the plan or in an appendix to show your work.



Concluding Recommendations

The 2016 Ashland Forest Plan is ripe for updating. At the time of its creation, its purpose was to confirm high level strategic direction based on 20 years of management effectiveness monitoring data. On page 153, that direction called for "implementing stand management and the use of prescribed fire, [to] encourage[e] a change in tree species composition back to one that is more diverse and more representative of historical compositions." This direction (and other strategies identified in the AFP) were consistent with best management practices for restoring western forest ecosystems altered by a century or more of fire suppression. Our understanding of the impacts of climate change have altered the equation; it is time to change direction by donning a forward-looking, "climate-smart" lens. Recommendations on how to proceed follow.

Recommendation 1: Explicitly link strategies and actions and document how those decisions are supportable based on scientific rationale and understanding of potential climate vulnerabilities.

We now know that accelerated climatic change is profoundly shifting ecosystem dynamics--altering their functionality, structure, and composition. The 2016 AFP acknowledges this shift but does not intentionally link strategies and actions to address both current stressors (such as forest densification) AND impacts driven by a changing climate (e.g., increasing average temperatures and altered precipitation forms and patterns). Linking climate impacts to strategies and actions is the first characteristic of a climate-smart adaptation plan.

Recommendation 2: Reconfigure project goals, objectives, and strategies based on a range of options that address current stressors (resistance and resilience options) AND intentionally manage for change (response option). Specific examples are provided on page 12 (above).

The second characteristic of a climate-smart adaptation plan are forward-looking goals and strategies that focus on the long view rather than restoring past conditions. Strategies that treat known ecosystem stressors to "buy time" until a better choice is developed are valid as long as the consequences are made clear and a timeline for alteration of the planned course is provided. A majority of the 2016 AFP text is directed at restoration of "the natural range of historic conditions." The 25 years of treatments applied have undoubtedly reduced stress and bought Ashland forest managers time to develop forward-looking options. The advantage of 25 years of documented management treatments and effectiveness monitoring data is enhanced understanding of historic conditions for select species and the human and ecological drivers of those conditions in the 1,100-acre treatment area. The time is ripe to use this wealth of experience and data to clearly consider how to manage for a no-analog future.

Recommendation 3: Use downscaled geospatial modeling to forecast a range of plausible future climate envelopes for desired species at the macro (whole watershed) and microscale (management units within the 1,100 acre area).

The AFP (page 53) correctly points out that "[i]mportant changes in forest and resource management strategies will have to occur on a much larger spatial and temporal scale than addressed in this 2016 Ashland Forest Plan (AFP)." The time is ripe to make this happen. Ashland has been a leader in regional forest management activities and taken bold steps that led to effective partnerships (e.g. AFR). I suspect that if the City of Ashland were to ask key persons to participate in an Ashland Watershed scale climate change vulnerability assessment to forecast shifts in species distributions and ecological processes, able partners will contribute important data layers and participate in the analytic process required to identify where on the landscape valued resources may survive unaided (refugia) or persist with or without assistance. I am willing to try to facilitate this process.

Recommendation 4: Deliberately adopt strategies robust to uncertain sociopolitical, economic, and environmental futures by broadly engaging community members in the change adaptation strategic planning process.

The 2014 Climate-Smart Conservation Guide contains practical ideas and tools to support change adaptation planning for an uncertain future. Chapter 8 is aptly named the "Art of the Possible: Identifying Adaptation Options." Chapter 9 is titled: "Choosing Your Path: Evaluating and Selecting Adaptation Options." Tools to analyze the socioeconomic and ecological consequences of alternative options are provided in these chapters as are case studies that demonstrate what others have learned and mistakes made. A key requirement to identifying, selecting, and successfully implementing adaptation options is stakeholder engagement.

Implementing these four general recommendations would enable the City of Ashland to anticipate the impacts of climate change and develop a customized plan for action that would create the forward-looking bridge currently lacking in the AFP.

In conclusion, I recommend that the City of Ashland adopt the 2014 Climate-Smart Conservation Guide framework introduced in this document and update the 2016 Forest Plan according to the principles and processes the Guide lays out.

If the City's Forest Lands Commission or City Council would like more information, please contact me. I may be able to facilitate AFP updating assistance through the Southwestern Oregon Climate Smart (SOCS) Working Group.

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