To: Custer Gallatin National Forest Supervisor, Matthew Jedra

From: Dr. Jesse A. Logan, USDA Forest Service , Rocky Mountain Research Station (retired)

Date: August 26, 2025

Subject: Objection to the Cooke City Fuels and Forest Health Project: Final Environmental Assessment

Relevant background: From 1992 to 2006 I was a Research Scientist and Project Leader for the Forest Service , Rocky Mountain Research Station. During that time, my primary research interest and expertise was the disturbance ecology of whitebark pine. I have published extensively in the peer-reviewed literature regarding whitebark decline in the Greater Yellowstone Ecosystem (GYE). Since retiring from Forest Service Research in 2006, I have remained active in advocacy for high-elevation forests of the Greater Yellowstone Ecosystem (GYE) and have maintained familiarity with the current whitebark literature.

INTRODUCTION

I was disappointed by the Forest Service 's misleading and inadequate response to comments on the Draft Environmental Assessment.

(1) The Forest Service response was invariably dismissive of legitimate concerns. There are 156 occurrences of the statement, "Comment considered but no changes needed". The Forest Service dismissed ***All*** valid comments and concerns regarding whitebark treatments with this statement. The next section of the Objection details the Forest Service 's inadequate consideration of substantive comments regarding the whitebark enhancement aspect of this project.

(2) The EA claims public involvement without acknowledging the overwhelming opposition to this project, primarily from citizens who are supposed to benefit. Of the 104 comments on the Scoping document, several of which were from local citizen groups representing multiple members, only four supported the proposed project. Of 39 comments to the EA, only six supported the project. An Excel spreadsheet summarizing comments to both Scoping and the EA is included in Attachment 9.

(3) This Project proposes a major, long-term, expensive project without any plan for evaluating treatment efficacy or ecological impacts. This violates NEPA and undermines the public's and qualified experts' ability to review the project meaningfully and submit comments. An opportunity to evaluate/monitor a previous whitebark enhancement project conducted from 2010 to 2014 (the **Fisher Creek Project**) was ignored in the EA.

(4) Sweeping generalizations are made in the EA without any supporting data, references, or citations. Once again, in violation of NEPA

(5) Vague and overly optimistic estimates of treatment results are consistently made in the EA without supporting evidence or citation of relevant scientific studies. Conversely, any well-documented unintended negative impacts are summarily dismissed — another NEPA violation.

(6) "Greenwashing" is prevalent throughout the document. Justifying timber management treatments by confounding timber objectives with whitebark pine enhancement objectives. Claims of whitebark enhancement are made without a clear statement of treatment objectives.

I have previously commented on the whitebark pine aspects of this project during the Scoping process and in response to the EA. Rather than reiterate these issues, I included them as Attachments 1 and 2 below. The concerns I have with this ill-conceived project remain. I have also included new information regarding the importance and necessity of a thorough evaluation of the Fisher Creek Project that was carried out in an area included in the current proposed project. The Forest Service 's lack of a credible response to these concerns is frustrating and inconsistent with the letter and spirit of NEPA.

NEPA "promotes its sweeping commitment to 'prevent or eliminate damage to the environment' . . . by focusing Government and public attention on the environmental effects of proposed agency action." *Marsh v. ONRC*, 490 U.S. 360, 371 (1989). By so doing, "NEPA ensures that the agency will not act on incomplete information, only to regret its decision after it is too late to correct." *Id*. "Ultimately, of course, it is not better documents but better decisions that count." 40 C.F.R. § 1500.1(c). NEPA strives to avoid "uninformed – rather than unwise – agency action." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-351 (1989). Central to NEPA's purpose is to ensure adequate public participation in the decision-making process. NEPA's process is designed to ensure that "the agency will inform the public that it has indeed considered environmental concerns in its decision-making process." *Balt. Gas & Elec. Co. v. Nat. Res. Def. Council*, 462 U.S. 87, 97 (1983). For this reason, NEPA requires agencies to make diligent efforts to involve the public from the outset and throughout the entire process. *W. Watersheds Project v. Zinke*, 441 F. Supp. 3d 1042, 1059 (D. Idaho 2020). Federal agencies must, to the "fullest extent possible," implement procedures to make the process "more useful" to the public and "encourage and facilitate public involvement in decisions which affect the quality of the human environment." *Id*. at 1069–70 (citing 40 C.F.R. §§ 1500.2(b),(d)). It is thus imperative that environmental information be made available to public officials and citizens before decisions are made and before actions are taken. *Id*. at 1070. None of this was adhered to in this case. The Forest Service largely ignored all the concerns I and others raised regarding daylighting and the proposed whitebark pine "enhancements."

This Objection to the EA will first focus on the Forest Service 's response to individual comments regarding whitebark treatments.

MY OBJECTIONS TO FOREST SERVICE RESPONSES TO SUBMITTED COMMENTS ON THE ENVIRONMENTAL ASSESSMENT.

Pp 113-114 response to Judith Visty's comment letter. In her comment, Ms. Visty expressed several concerns about the whitebark enhancement aspects of the EA. The Forest Service dismissed all of these concerns with, "Comment Considered but no changes needed."

Ms. Visty's concerns can be summarized by:

(1) Lack of evidence supporting the efficacy of daylighting treatments for whitebark. The FOREST SERVICE response acknowledged the lack of long-term monitoring that demonstrated efficacy. The FOREST SERVICE further justified daylighting by stating, "However, increasing the vigor of trees by reducing competition is a standard silvicultural practice with extensive research to support it." While it is true that thinning treatments have resulted in increased radial growth, this timber value has not been demonstrated to be of benefit in high conservation value whitebark forests. The value of a whitebark forest is measured by the ecological services it provides (Lindenmayer, 2025), not by the board feet it produces. There is *only one* referred publication that evaluates the efficacy of whitebark silvicultural treatments similar to those

proposed in this project, Maher et al. (2018). They conclude, "While some management goals were achieved, many were not, and there were some unintended consequences." The EA did not include Maher's study in the References cited and misrepresented it in their response to Ms.Visty's comment. (see also Attachment 2, Section IV)

(2) Using cited research (all with Keane as lead author and none in the referred scientific literature) to support daylighting, when in fact the cited studies are for treatments different than that proposed (daylighting by itself with no subsequent planting of whitebark). The FOREST SERVICE response did not address the criticism of non-peer-reviewed sources as their primary scientific authority.

(3) Collateral (unintended) damage from mechanical treatments. The FOREST SERVICE acknowledged that unintended, negative impacts are possible; however, they dismissed those mentioned in the EA by stating that "(they) are not assured to happen." The FOREST SERVICE then justifies daylight treatments by saying that "reduction in tree density are ***hoped*** to improve individual whitebark pine tree vigor." In other words, they dismiss negative impacts because they are not assured, but they accept positive outcomes because they "***are hoped***" to occur. You can't have it both ways.

(4) Lack of any plan to evaluate treatment results. The FOREST SERVICE did not respond to this comment. Maher et al. (2018) noted this to be a chronic failure of FOREST SERVICE active management, such as that proposed. The Forest Service routinely implements active management treatments without conducting subsequent evaluations of their efficacy. (Refer to Attachment 2, Section IV) and the discussion below regarding the Fisher Creek Project.

(5) Failure to evaluate a previous (2011 – 2013, hereafter the Fisher Creek Project) whitebark enhancement project in the Fisher Creek drainage. No response from the Forest Service . A unique opportunity exists within the proposed treatment area. The 2011-2013 thinning treatments were essentially the same as those proposed for the current project, including both treatment and control blocks. It is irresponsible to proceed with the current project without evaluating the efficacy of the previous project. Further, both treatment and control blocks from the Fisher Creek Project are within the area proposed for treatment in the current project. Conducting the proposed treatments over the existing Fisher Creek Project treatments would obliterate forever any opportunity to evaluate the efficacy of the Fisher Creek Project. As noted previously, conducting expensive and disruptive vegetation management projects without evaluating effectiveness is a chronic failure of the Forest Service . Refer to the response to Sara Johnson's comments on pages 7 -9 of this Objection.

(6) Removal from the project of the active planting program that the Forest Service discussed in public meetings. No response from the Forest Service .

(7) Negative wildlife impacts. No response from the Forest Service .

p. 114 response to Max Hortsberger (Park County Environmental Council) comment letter.

Mr. Hortsberger's concerns can be summarized by:

Unintended consequences leading to the displacement of whitebark pine by lodgepole pine. The FOREST SERVICE acknowledged that climate change could lead to the loss of whitebark habitat, but then launched into a lengthy discussion of fuel reduction benefits for whitebark without providing any supporting data or literature citations, thereby confounding the objectives of fuel treatments with those of whitebark enhancement.

p. 115 response to Jesse Logan #1

My concerns addressed in the first FOREST SERVICE response:
Lack of justification for vegetation management in one of the healthiest whitebark forests in the entire Greater Yellowstone Ecosystem. As stated in Attachment 2, "The climax whitebark forests in the Cooke City area are among the healthiest remaining in the entire Greater Yellowstone Ecosystem (GYE)." The EA fails to justify the need for disruptive vegetation management in these remarkable forests. "Mechanical" treatment method is proposed for all units in the climax whitebark zone (those above 8,700', Fig. 1). Of the two treatment choices (Mechanical and non-Mechanical), the ecological collateral damage of Mechanical treatment is by far the greatest. Why is it that the most destructive treatment method is proposed for the most ecologically sensitive forests in the proposed project?

Furthermore, the Management objective for many of these (75, 76, 80, 84, 85, 86, 88) is "Timber Stand Improvement" (Table 1). Nowhere in the EA can I find a definition of 'Timber Stand Improvement.' Does the name imply a future management objective of timber production and/or a timber sale? If so, this management objective is in clear violation of the ESA's designation of the whitebark as a Threatened Species. The Forest Service needs to clarify this in a full EIS; failure to do so violates both the letter and the intent of NEPA.

UNIT_No	ACRES	Method	Commercial	Management	ProposedTr
77	33.64640756	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
78	44.45059253	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
76	38.82394558	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning
79	178.1180834	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
82	73.48439275	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
83	39.80334339	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
75	178.5465206	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning
80	112.8904504	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning
87	1.409552762	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning-Fuels
86	8.512791054	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning
93	63.89689186	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
91	37.57665642	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
95	15.94191454	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
94	15.09901791	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
90	65.74023474	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
84	39.68598127	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning
30	66.92459269	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
29	30.73896884	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
28	52.89821781	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning
85	35.90930892	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning
87	24.19732511	Mechanical	Non Commercial	Intermediate	Improvement Cut WBP-Understory Daylight Thinning-Fuels
88	10.31726096	Mechanical	Non Commercial	Timber Stand Improvement	WBP Enhancement-Daylight Thinning

Table 1. Treatment polygon information for whitebark treatment units above 8,700'.

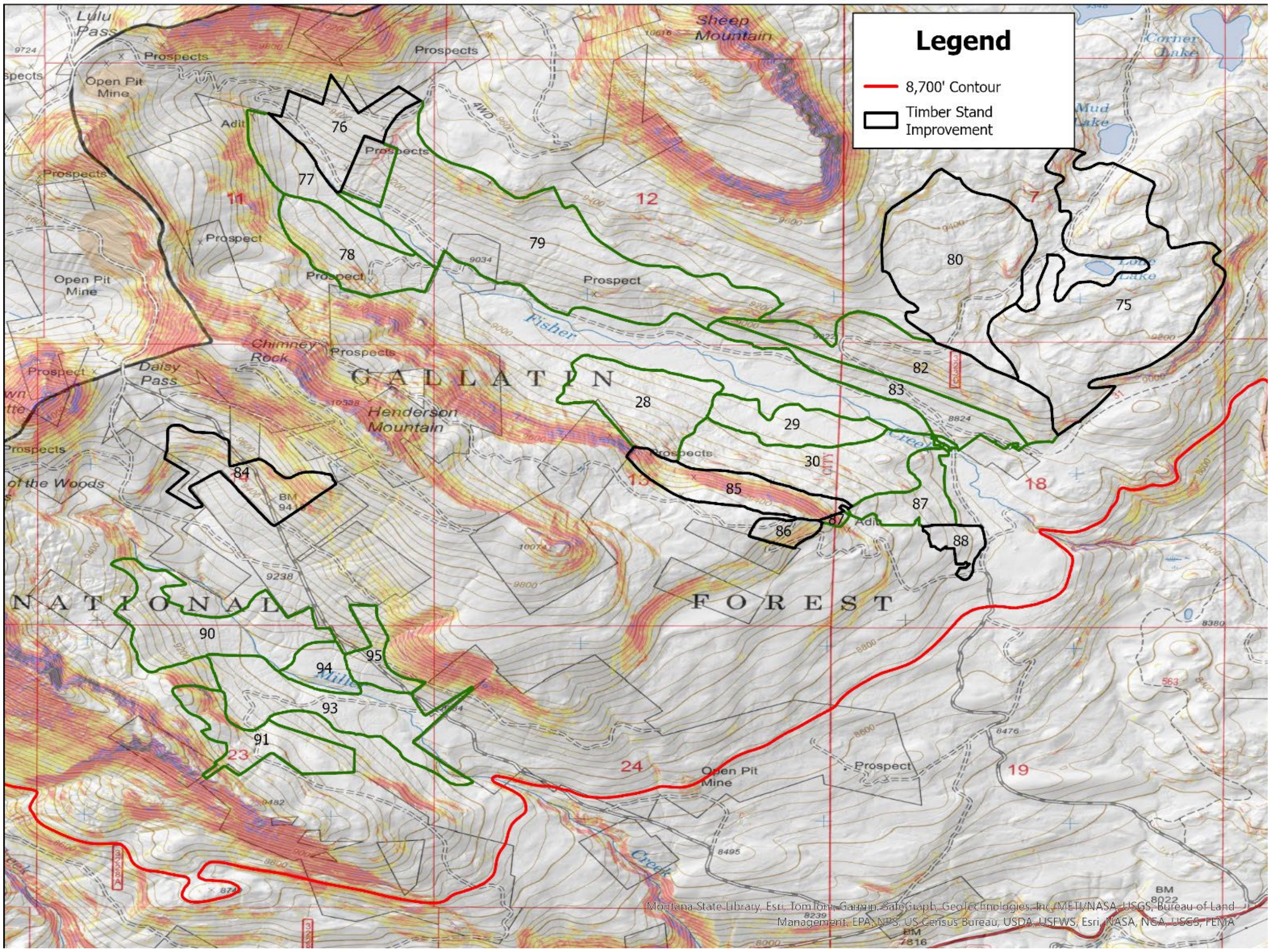

Figure 1. Treatments in climax whitebark forests above 8,700' with "Timber Stand Improvement" as the Management objective in black.

The Forest Service response begins with the statement, "The Cooke City project is first and foremost a fuels project." Thereby, greenwashing by claiming whitebark enhancement (an ecological objective) for a fuels project (a management objective). If this is a fuels project, then why include Whitebark Enhancement in the treatment prescriptions? Forest Service states, "Treatments are designed to moderate fire behavior into more typical fire severities." Daylighting is not a fuels treatment. The treatment for some of the climax whitebark stands above 8,700' (Fig. 1) is " WBP Enhancement-Daylight Thinning-Fuels," achieved through Mechanical method. The description of mechanical fuel treatments (p. 12, Table 3, EA) states, "Trees less than nine inches in diameter would be removed to create 15- to 25-feet of crown spacing." This treatment is incompatible with whitebark enhancement and the EA statement on pp. that, "Whitebark pine trees will not be cut in any proposed treatment throughout the project area." How will mechanical thinning be accomplished in a way that seedling and sapling whitebark will not be damaged? (Refer to Attachment 2, Section I).

The EA states, "The Cooke City project is first and foremost a fuels project." If so, note that the majority of whitebark treatment polygons above 8,700' do not include "Fuels" in the treatment. Is

"WBP Enhancement-Daylight Thinning" simply greenwashing a thinning project?

p. 116 response to Jesse Logan #2

As noted in this comment, much of the area proposed for Whitebark Enhancement-Fuels Treatment below 8,700' is a post-1988 fire-regenerated lodgepole pine forest (Attachment 2, Fig.3) that contains no whitebark. Additionally, why are these polygons proposed for mechanical fuels treatment so soon following a stand replacement fire?

As noted previously, Mechanical fuels treatment calls for the removal of trees with DBH less than or equal to 9 inches to a 15-to-25-inch crown spacing. A nine-inch diameter tree is a relatively large lodgepole, and what proportion of these regenerated lodgepole (less than 38 years old on a south-facing, dry site) are smaller than 9" DBH? Thinning to the proposed level will dramatically reduce snowshoe hare habitat, with trophic cascading impacts on lynx and other sensitive wildlife, such as wolverine. As a backcountry ski guide, I have spent over 2,000 days on skis in the Cooke City area over the past 19 years, including extensive ski-touring in the climax whitebark forests proposed for treatment. I invariably cross wolverine tracks at some time during the ski season, like these tracks from last spring. The entire project includes utilized wolverine habitat (USF&W 2018). Implementing a vegetation management project without a complete impact analysis on lynx wolverine habitat and distribution is another NEPA violation.

The proposed treatments will set succession back to post-1988 fire levels. Recovery from the proposed treatments will, in fact, be slower than that from a stand-replacing fire due to soil compaction and other artificial disturbances associated with the proposed mechanical treatment. Active management, like that proposed, has the potential to lead to significant degradation of ecological integrity. Treatment so soon following a stand-replacing fire clearly interrupts the cyclical nature of forest succession, reducing forest diversity and resilience (Lindenmayer et al., 2025). At the very least, a stand inventory is needed for these treatment units.

p. 117 response to Jesse Logan #3, This comment notes the failure of the EA to adequately consider and evaluate the direct, indirect, and cumulative impacts of climate warming on whitebark pine, including but not limited to the elevational displacement of whitebark pine (US Department of the Interior 2022). See discussion on pages Attachment 2, pp. 4-5. Forest Service response does not address these concerns or potential effects but rather reiterates the need for fuel treatment. A complete evasion of the issue raised by my comment. Also see discussion below at the bottom of page 8.

p. 117 response to Jesse Logan #4. In my comment to the EA, I noted that whitebark pine and subalpine fir have coexisted for untold centuries in this healthy whitebark forest, and I questioned the need for active management that would disrupt this longstanding, natural relationship. My comment further noted that the identified primary risks to whitebark are white pine blister rust, mountain pine beetles, and a warming climate (US Department of the Interior 2022). The best available science indicates daylight thinning will not reduce the threat from these factors (Lindenmayer 2025). The Forest Service 's response was vague, speculative, and offered without supporting data or documentation, noting only that "The hope is that treatments would provide competitive release, making the trees more vigorous and able to respond to these threats." Yet, the scientific literature offers little support for this wishful thinking (Six et al., 2014), and in fact, thinning may increase the vulnerability to mountain pine beetle Six et al. 2021 concluded that, "In our study, as well as in that of Kichas et al. (2020), faster overall growth was the strongest predictor of mortality due to *D. ponderosae* indicating that such treatments will not have their intended effect in *P. albicaulis* and may even be detrimental."

p. 117 response to Jesse Logan #5. Lack of ecological cost/benefit analysis. A minimum requirement for management activities in high conservation value forests.

The Forest Service response, "The study by Maher et al. did show an increase in subalpine fir and lodgepole pine recruitment after vegetation treatments in one out of five stands studied." This statement is misleading. The full quote from Maher et al (2018) is, "..., ***no increase in whitebark pine recruitment associated with treatments at any site***. However, at one site, treated stands had higher regeneration of non-target species than did untreated stands." They go on to note that, "we found weak growth increases at one site, weak growth decreases at another, and no response at two other sites." A mixed result, with only one site out of five achieving the desired goal.

The Forest Service response goes on, "This same study also showed significantly reduced mortality to whitebark pine after treatment in this same stand." Again misleading. Although one treatment did show lower mortality, Maher goes on to say, "at the other sites (four of five sites), there was no difference in mortality between treated and untreated stands." Reduced mortality in only one of five sites is hardly a rousing endorsement.

Maher's results indicate the ambiguous, at best, history of active management for improving whitebark stand condition. I note that not citing Maher et al. (2018) in the EA is an egregious oversight, misleading to the public, and a violation of the NEPA.

p. 118 in response to Lara Belice's comment, Ms. Belice commented, "The ESA provides unconvincing information regarding its suggestions of treatments for whitebark pine areas. On pages 30-31, the EA uses the words "speculative, unknown, unclear, not all damage may be preventable" when referring to suggested whitebark pine treatments. Whitebark pine areas are too important to risk inconclusive treatment

The Forest Service 's response to this comment is telling because it exemplifies the Forest Service response throughout the Final EA.:

(1) The Forest Service Eresponse dismisses this concern by one of 156 occurrences of "Comment considered but no changes needed."
(2) The Forest Service makes sweeping generalizations without any supporting data, references or citations., "In the absence of such research, *standard silvicultural practices which have a long history of research behind them* are the resource best used to develop treatments..." (see pp.2 response to Judith Visty's comment)
(3) The justification for the use of "standard silvicultural practices" with respect to whitebark pine treatments is, at best, misleading (see pp.2 response to Judith Visty's comment)

Ms. Belice further suggests relief to her concerns by, "Units with Whitebark pine trees should be removed from the project until substantive current science-based data can be provided that indicates treatments will definitively benefit one of the healthiest whitebark regions remaining within the Greater Yellowstone Ecosystem System."

p. 119 in response to Sara Johnson's comment, Ms. Johnson raises three concerns:

(1) Failure to evaluate the efficacy of the Fisher Creek Project. The Forest Service 's reasoning for not taking advantage of this obvious opportunity is less than convincing. The statement made by the Forest Service that "The Fisher Creek was essentially designed to provide a student with real-world vegetation monitoring experience in the short-term but did not have the long-term commitment needed to assess the results of daylighting on whitebark pine health." This statement implies an insignificant, casual “student project.” This perception is misleading. In fact, the Forest Service treated this as a serious project, as indicated in the March 10, 2010, Request for Public Scoping Comments, Gardiner District Ranger Mary Maj (Attachment 3). In the Scoping Letter, Ranger Maj clearly states a commitment to monitoring. Project vegetation treatment for “Dominant whitebark with some subalpine fir” is the same as that currently proposed for whitebark enhancement. There was no mention of an objective to “provide a student with real-world vegetation monitoring experience.”

(2) District Ranger Maj responded to Scoping comments in a letter dated July 19, 2010 (Attachment 4) that identifies the unique opportunity provided by the Cooke City area whitebark, a clearly stated objective of whitebark pine regeneration, and the use of controls to monitor the effectiveness of treatments. The Forest Service followed up with considerable planning efforts, including a field trip involving expert consultants, to further refine the project design. Field notes from the August 12, 2010, field trip are included as Attachment 5. A proposal requesting funding for a Cooke City Whitebark Pine Restoration Project that included project design as “ A fully replicated factorial design with aspect, slope location, open, beetle-killed, and green /healthy whitebark, treated (remove competing species) and untreated units.” was submitted on December 6, 2010 (Attachment 6). A pre-treatment monitoring project was conducted, and the results from this project, dated December 8, 2011, are included as Attachment 7. Field work was carried out during the 2011 – 2013 field seasons, and monitoring of results was conducted one year following treatments. The final project report is included as Attachment 8 (Lorenz, 2014). No further monitoring was conducted even though the final report acknowledged that, “Importantly, the thinning treatments were conducted only one year prior to our 2014 surveys and so many of the expected treatment induced vegetation changes had not yet occurred.”

(3) The current proposed whitebark treatments (treatment units 79,105, 82, 83, 28, 29, 30, and 87) include all the Fisher Creek project treatments and controls (Fig. 1). If the current treatments are carried out as proposed, a unique opportunity to evaluate the efficacy of the currently proposed treatments will be irrevocably lost. The Fisher Creek Project is one of the few Forest Service vegetation projects that contain adequate control plots required to evaluate efficacy. Fourteen years (since first treatments in 2011) post-treatment is long enough (two, possibly three masting cycles) to assess nutcracker caching activity and subsequent recruitment. Seedling establishment and subsequent growth would be evident on the landscape.

(4) The Fisher Creek daylight treatment results remain on the landscape. What prevents evaluation of these results, as initially planned, before launching on a much larger-scale project with questionable efficacy? The Forest Service response avoids answering this simple, straightforward question. (also refer to Forest Service response to Judith Visty’s comment).

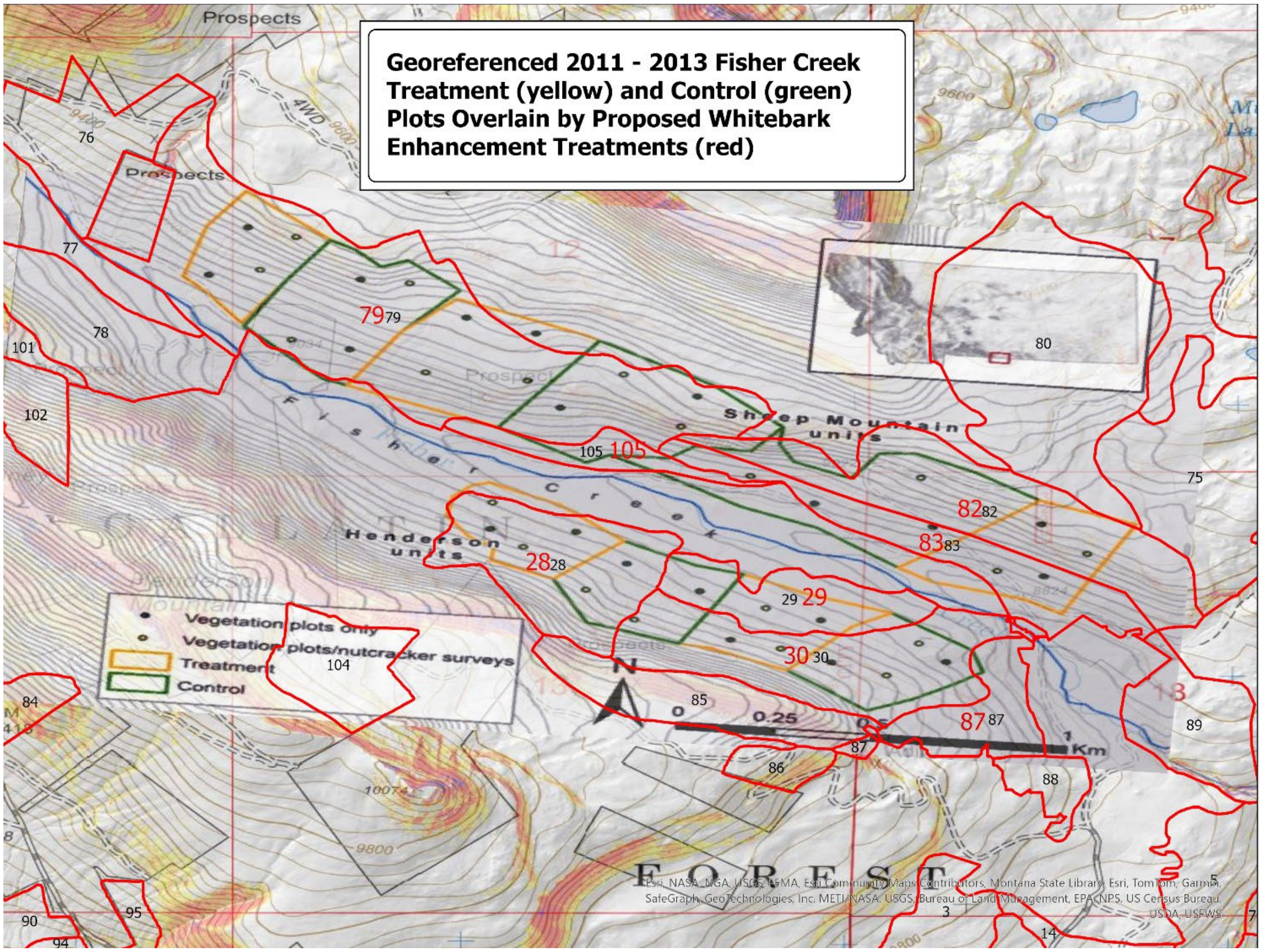

Figure 1. Pre- and post-treatment vegetation monitoring for the Fisher Creek project was made at the 38 indicated points. See Attachments 5 and 6 for a description of the data collected at the indicated sampling sites.

(1) Lack of evidence to support improved regeneration following thinning treatments in whitebark. The Forest Service response admits that regeneration is not a project objective. They further state that daylight treatments ***could*** provide seed caching sites. Where is the supporting evidence for this statement? Providing improved seed caching was one of the objectives of the Fisher Creek whitebark daylighting project. In fact, ***results from the Fisher Creek project found no significant difference in nutcracker activity between treatment and control plots*** (Attachment 6 and Lorenz, 2014).

(2) Concerns regarding collateral damage of treatments destroying seedlings and saplings. The Forest Service's response that, "While it is true that the degree to which small trees would be impacted is unknown the contention that vast amounts of recruitment would be destroyed is also ***conjecture.***" This statement is misleading and overlooks the well-documented evidence in the peer-reviewed literature of collateral damage resulting from thinning, including increased temperature (Hao et al., 2024), soil disturbance (Bolding et al., 2009), and damage to seedlings and saplings (Surakka et al., 2010). The documented benefit of thinning in the context of this project is increased radial growth. Increased radial growth is a valid objective for commercial forests, but not for high-conservation-value whitebark forests. Regeneration, resiliency, and

persistence on the landscape are legitimate conservation objectives that the EA and the Forest Service response to comments ignore. The statement is made that "The EA does not propose restoration for whitebark pine." What is it then that the EA ***does*** propose?

p. 137 in response to Sara Johnson's comment. Ms. Johnson notes the lack of evidence supporting the need for whitebark treatments within IRAs. Instead of supplying evidence for the need, the Forest Service cites regulations governing IRAs. This response is a non-answer. Whitebark treatment blocks 70, 75, 80, and 82 are within the Beartooth IRA. As such, these treatments have high conservation, scenic, and recreational value. Lack of demonstrated need once again violates NEPA.

p. 137 in response to Michael Garrity's comment. Mr. Garrity raises the lack of supporting evidence that daylighting increases regeneration, while ignoring the collateral damage of treatments. As in previous responses to this concern, the Forest Service response is to make unsubstantiated conjectures about improved vigor, which is itself a questionable objective for a high-value conservation forest.

MY COMMENTS ON THE ENVIRONMENTAL ASSESSMENT THAT THE FOREST SERVICE DID NOT RESPOND TO

I. Healthiest climax whitebark forest in the entire GYE. Section I, Attachment 2, page 1.

Inadequately considering climate warming effect of shifting whitebark's future distribution to higher elevation habitats that are near or above current treeline. Section V, Attachment 2, and the referred journal articles cited therein. To summarize my previous comments: (1) The rate of climate warming for high elevation whitebark habitat is greater than the global average (Wang et al. 2014, Palazzi 2019, Rangwala and Miller 2012) (2) Model predictions and subsequent events have documented the unprecedented loss of whitebark in the Greater Yellowstone Ecosystem resulting from warming temperatures (Attachment 2). (3) Model predictions that the future whitebark habitat will be dramatically reduced by the end of the current century have been supported by recent observations (Attachment 2). (4) Vegetation management for whitebark proposed for this project ignores these realities and is in clear violation of the Best Science principle (which applies to NEPA, NFMA, and the ESA). Not only is the current EA in violation of the NEPA Best Science principle, but it also ignores the advice and recommendations of Forest Service scientists (Timberlake and Schultz 2017, Joyce et al. 2009, Peterson et al. 2011, McNulty and Aber 2001, Vose et al. 2013, Vose and Klepzig 2013).

Instead of the current EA, that includes questionable vegetation prescriptions that carry unavoidable collateral damage, and given the amount of scientific controversy and uncertainty over the proposed project and its direct, indirect, and cumulative impacts to one of the last remaining and healthiest whitebark pine forests in the Greater Yellowstone Ecosystem - a threatened species -, as well as the other issues raised by the other objectors, a full Environmental Impact Statement ("EIS") is required. An EIS should thoroughly examine the science on daylighting and its effects on whitebark pine, as well as the other valid whitebark pine issues raised during the previous comment processes (both scoping and comments on the draft EA). An EIS would alleviate much of the agency's uncertainty and speculation, which is the primary purpose of engaging in a NEPA process. A climate-smart approach (Nadeau et al. 2015) is necessary to examine alternatives, which include identifying critical future habitats and implementing an aggressive planting project (direct seeding and seedlings) in these identified habitats (Pansing and Tomback 2019, Ireland et al. 2018). Opportunities exist within the proposed project area that are compatible with both the predicted future distribution of whitebark pine and current forest management policies, as detailed by Ireland et al. (2018). The Forest Service should not overlook the unique opportunity to pursue an aggressive, focused planting program in favor of the ill-advised treatments proposed in this project, which are unlikely to enhance the future of whitebark in a rapidly warming climate. Any whitebark management activities that fail to identify emerging critical habitat resulting from a warming climate are hopelessly short-sighted and likely to result in collateral damage that far outweighs any benefit.

II. Failure to respond to the suggestion of redirecting funding to facilitate the migration of whitebark into the climate-driven emerging habitat.

A more effective expenditure of funds than supporting questionable management treatments that include significant collateral damage would be to allocate these dollars to support an aggressive whitebark planting program near and above the current treeline. Apparently, the Forest Service considered planting at a public meeting, but it was dropped from the final project proposal (see Judith Visty's comment on page 114 of the EA). If one of the project's purposes is the enhancement of whitebark pine, then this is a reasonable and viable alternative that should have been, but was never, evaluated and analyzed. Facilitated migration is a climate-smart approach that avoids the collateral damage of mechanical (and non-mechanical) treatments in whitebark. A full description of the likely loss of whitebark in its current range, concurrent with the emergence of new favorable habitat, is provided in Attachment 2, Section II. Briefly, evidence for this migration is:

(1) Whitebark is supremely adapted to environmentally harsh conditions; however, the same attributes that facilitate this adaptation also result in whitebark being competitively inferior to other conifers.
(2) This evolutionary adaptation allows whitebark to exploit climate-driven habitats in response to periods of climate warming/cooling.
(3) Both model results and empirical evidence support the climatic plasticity of whitebark.
(4) Vegetation management with the objective of whitebark enhancement that ignores these basic principles of whitebark adaptation is unlikely to achieve management objectives.
(5) Identifying emerging critical habitats and designing treatments that focus on these habitats are essential management approaches.
(6) Assisted migration through an aggressive planting project would address the issues of a rapidly warming climate while also avoiding collateral damage associated with the current proposed treatments.
(7) Hyperlinks to key scientific research supporting facilitated migration have been added to the Literature Cited for Attachment 2.

RELIEF

(1) Remove all whitebark treatments from the project.
(2) Conduct a comprehensive efficacy evaluation for the Fisher Creek Whitebark Project. This project is a potentially significant contribution to the sparse data on the efficacy of vegetation treatment for the high conservation value whitebark pine. This opportunity will be irrevocably lost if the current project is carried out. It is unfathomable to lose this opportunity through an unsupported and ambiguous vegetation management project that lacks control treatments or plans for future monitoring.

(3) Comprehensive stand evaluation of climax whitebark forests in the Cooke City Area. What is the current stand condition of whitebark treatments in the proposed project area? How can an effective treatment prescription be made without characterizing the forest type and condition? One size does not fit all. A climax forest is vastly different from a successional forest where whitebark is co- or sub-dominant.

(4) Conduct Full EIS. The EA is grossly deficient, and the Forest Service's responses to comments detailing these deficiencies are patently inadequate. The significant implications of this project are far-reaching enough to warrant a full EIS.

(5) Carefully evaluate and analyze all the direct, indirect, and cumulative effects of treatments in the whitebark units of the proposed project.

(6) Disclose and discuss the best available science on the efficacy of daylight treatments for whitebark pine in the Greater Yellowstone Ecosystem.

(7) Conduct a comprehensive ecological (vs. economic) cost/benefit analysis. Both the environmental costs and benefits of treatments in the high-conservation-value whitebark pine forest need to be considered. Considering the ambiguous nature of the proposed daylighting treatments, a thorough ecological cost-benefit analysis, including future projections of climate warming-induced shifts in habitat, is a necessary component of the EIS.

(8) Adopt a Climate Smart evaluation of whitebark treatments. Critical habitat in a rapidly warming world needs to be included in the EIS and in determining proposed treatment sites.

(9) A clear, unambiguous statement of objectives for daylight treatments that is consistent with the conservation value of these forests.

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LIST OF ATTACHMENTS

Attachment 1. Comment to Forest Scoping (Preliminary Effects). Dated August 12, 2024

Attachment 2. Comment to Environmental Assessment. Dated April 25, 2025

Attachment 3. Request for Public Scoping for the Fisher Creek Project. From Gardiner District Ranger Mary Maj. Dated March 10, 2010

Attachment 4. Response of District Ranger Mary Maj to my Scoping comments. Dated July 19, 2010.

Attachment 5. Field Notes from Fisher Creek Project review. Dated August 12, 2010.

Attachment 6. Proposal for Whitebark Pine Restoration Project (Fisher Creek Project). Dated December 6, 2010.

Attachment 7. Summary of pre-treatment monitoring for Cooke City Whitebark Pine restoration project (Fisher Creek project). Dated December 8, 2011.

Attachment 8. Summary of post-treatment monitoring for the Cooke City Whitebark Pine Restoration (Fisher Creek project). Dated December 31, 2014.

Attachment 9. Excel spreadsheet summarizing scoping and EA comments.

ATTACHMENT 1. Comment to Forest Scoping (Preliminary Effects)
To: Mike Thom, District Ranger, Gardiner Ranger District

From: Dr. Jesse A. Logan, USDA Forest Service , Rocky Mountain Research Station (retired)

Date: August 12, 2024

Subject: Comment letter on proposed Cooke City Fuels and Forest Health Project.

Relevant background: From 1992 to 2006 I was a Research Scientist and Project Leader for the Forest Service , Rocky Mountain Research Station. During that time, my main research interest and expertise was the disturbance ecology of whitebark pine. I have published extensively in the peer-reviewed literature regarding whitebark decline in the Greater Yellowstone Ecosystem (GYE). Since retiring from Forest Service Research in 2006, I have remained active in advocacy for high-elevation forests of the GYE and have maintained familiarity with the current whitebark literature.

My response to this proposal

The climax whitebark forests surrounding Cooke City, Montana are among the healthiest remaining in the entire GYE (Macfarlane, et. al 2013, 2023). What is the rationale for disruptive management action in the name of forest health for an already healthy forest ecosystem? The adage of "if it ain't broke don't fix it" applies here. As with many heavy-handed management practices, the proposed daylighting treatments have the potential to backfire resulting in reduced not improved forest condition. For example, how would it be possible to avoid disturbing whitebark seedlings? Whitebark and subalpine fir have co-evolved and co-adapted for millennia in these forests and this co-evolution has resulted in a stable healthy forest ecosystem. Why is it now necessary, or even advisable, to "manage" these forests through disruptive manipulation?

On page 23 of the statement is made that, "It is hoped that these treatments would benefit whitebark pine by reducing the competition from other trees." Without any supporting evidence. The reason for the lack of supporting evidence is that there is ***no*** scientific, peer reviewed research to support this statement. The daylighting treatment in whitebark has simply not been evaluated. While there is no support for any benefits of daylighting, the collateral negative impacts are clear. In fact, potential negative impacts on the critical wildlife species of grizzly bears, wolverine and lynx are noted in the proposal (pp. 23 – 26). There are ***no*** whitebark publications listed in the References – was even a cursory review of the whitebark literature made? How can this claim to be best science management when apparently there was no science involved.

What were the criteria for treatment polygons? Why multiple, contiguous polygons with identical Management Type and Proposed Treatments. Conversely, polygons with very different stand composition and environmental conditions have identical Management type and Proposed Treatments. The entire classification process needs to be more transparent. One size does not fit all, a climax whitebark forest vastly differs from a successional whitebark forest.

On page 24 of the proposal, a 300 ac. vegetation management project in Fisher Creek is referenced. Was this project successful in improving whitebark health? The effect of this project needs to be evaluated before embarking on an even more expensive and questionable management project.

In summary, the proposed daylight thinning is unnecessary and in fact detrimental to whitebark ecosystem health. It is a waste of resources, time and money that could be better spent in management that has a chance of improving whitebark health into the future. For example, instead of daylight thinning, how about an ambitious project of planting seedlings (or seeding) the subalpine/alpine interface? This would be a positive, less disruptive, climate-smart approach that holds the potential for improving whitebark's survival chances into the future.

Although my primary concern with this proposal is the potentially deleterious impact on whitebark pine, as an avid angler the potential for a 270% increased siltation of Soda Butte Creek (p. 20) raises a red flag. Judging from the size of this project, increased siltation will likely occur for several consecutive years – this on the heels of the devastating 2022 flood. Soda Butte was poisoned (rotenone) for two consecutive years, shortly thereafter experienced a devastating flood, and now will be subjected to increased siltation for several more years. The ***cumulative*** effects of these disturbances need to be considered. In my personal experience, the impacts of siltation are not recoverable in any reasonable time-frame – it holds the potential for regime shift, particularly in conjunction with an onslaught of other significant disturbances. The evaluation of this disturbance, as with all other impacts listed in this proposal, is dismissive without adequate support for this attitude.

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Respectfully Submitted,
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ATTACHMENT 2. Comment to Environmental Assessment
Date: April 25, 2025

TO: Mike Thom, District Ranger, Custer-Gallatin National Forest, Gardiner Ranger District, P.O. Box 5, Gardiner, MT 59030

Subject: 30-Day comments on the proposed Cooke City Fuels and Forest Health project.

Relevant background: From 1992 to 2006, I was a Research Scientist and Project Leader for the Forest Service , Rocky Mountain Research Station. During that time, my primary research interest and expertise was the disturbance ecology of whitebark pine. I have published extensively in the peer-reviewed literature regarding whitebark decline in the Greater Yellowstone Ecosystem (GYE). Since retiring from Forest Service Research in 2006, I have remained active in advocacy for high-elevation forests of the GYE and have maintained familiarity with current whitebark research and literature.

My response to this proposal:
The Cooke City Fuels and Forest Health Project is so ambitious, and the potential negative impacts are so far-reaching that I hardly know where to begin. I have concerns about wildlife, public safety, inventoried roadless areas, and the list goes on. Although these concerns are real, because of educational and vocational background, I will restrict my comments to forest health issues, particularly those relating to the proposed whitebark pine enhancement treatments.

I. Healthiest climax whitebark forest in the entire GYE
The climax whitebark forests in the Cooke City area are among the healthiest remaining in the entire Greater Yellowstone Ecosystem (GYE). During the recent major mountain pine beetle (MPB) outbreak that killed over 70% of cone-bearing GYE whitebark (Thoma, et al. 2019), the Cooke City area was one of few that was largely unaffected (Macfarlane, et al. 2013, Fig. A.1). Although more recent work (Macfarlane et al. 2023) documents continuing post-outbreak MPB chronic mortality, the Beartooth Plateau and the climax whitebark forests surrounding Cooke City remain among the few areas with low cumulative mortality (Fig. A.2).

The proposed whitebark enhancement treatments (those that contain whitebark) are climax whitebark forests that have been on this landscape for centuries (my estimate based on past research experience is that they are at least 400 years old). The competing forest type that will be mechanically removed are primarily, if not entirely, subalpine fir. Subalpine fir and whitebark have co-existed for untold millennia in these subalpine habitats resulting in the current stable, healthy climax whitebark forests.

What is the justification for disturbing this co-evolved relationship that has resulted in stable, healthy forests? How can disruptive management intervention applied to an already healthy system meet the requirement of best science? At the very least, a thorough inventory should be made that documents the forest health status of the proposed treatment polygons, including characteristic stand age, and level and source of any existing mortality. The Forest Service needs to conduct a full EIS before proceeding with this ambitious project with far-ranging impacts.

II. Whitebark forests of today are not the whitebark forests of the future
Whitebark pine is supremely adapted for survival in climatic conditions that are too harsh for most

other conifer species (McCaughey et al. 1990). The entire evolutionary strategy of whitebark has been to avoid competition from other conifers and depredation by insect pests by occupying these high-elevation habitats (Logan and Powell 2001). The same adaptive traits that result in whitebark suitability for high elevation, harsh environments result in vulnerability to a warming climate (Igesias et all. 2008). The current distribution of whitebark in the Greater Yellowstone Ecosystem is primarily restricted to subalpine habitats greater than 8,500 ft. to the current treeline Maher (2018). With increasing temperatures, the loss of conditions that maintain whitebark on these currently occupied landscapes will occur within a 100 yr. planning framework regardless of management actions. A preponderance of peer-reviewed research supports this assertion.

The history of whitebark during the Holocene supports the progressive migration to higher/harsher habitats as the climate warmed following the Yellowstone ice cap retreat. With the retreat of ice, alpine tundra were the first plants to colonize this emerging habitat. Five needle pines, most likely whitebark, were next. Sediment analysis from Dailey Lake (elevation 5,500 ft.) indicates that at one time, whitebark occupied this site (Gennett and Baker 1986), while its current distribution is restricted to elevations greater than 8,500 ft. to the current treeline (Macfarlane, et al. 2013), the distribution for the Cooke City Fuels Project are elevations above 8,700 ft. (Fig. A 3)

Climate envelope modeling (Chang et al. 2914) indicates an upward shift resulting in a 70% loss of suitable whitebark habitat by the end of the century. In other research projects, whitebark's range will be dramatically reduced (Rommie and Turner 1991, Bartlein et al 1997, Schrag, et al. 2008, Sidder, et al. 2016, Hansen et. al 2016, Buotte et al 2017, Chavez et al. 2018). While these differ in their predictions depending primarily on the climate scenario used, the consensus is the loss of significant habitat through upward elevational migration by the end of the current century.

Recent research results from melting snowfields on the Beartooth Plateau found that whitebark has shifted its range upwards by at least 600 vertical feet above the present treeline during past warm periods and downward to lower elevation during cold periods (Pederson et al. 2024). Other research documents the advance of competitively superior species into current whitebark habitat during previous warm climates (Fall, et al. 1995, Maher 2018, Lenoir et al. 2008). This combination indicates that whitebark was competitively displaced to elevations higher than its current distribution during previous warm periods. This empirical evidence reinforces model predictions that whitebark habitat of the near-future is not that occupied today, and that vegetation management treatments focused on the current distribution of whitebark is, at best, futile and disruptive.

The lower elevation (less than 8,700 ft. in elevation) polygons scheduled for whitebark enhancement treatment (Figs. 3, 4 A, B) was aggressively colonized by lodgepole pine following the 1988 Storm Creek fire, which raises the question, what is the percentage of non-serotinous cones in this lodgepole regeneration forest? What is the chance that up-slope winds will disperse lodgepole seeds into the proposed whitebark enhancement treatments in the Fisher and Miller Creek drainages, where enhancement treatments will facilitate lodgepole seedling establishment (Maher 2018a, b).

The current whitebark distribution proposed for treatment includes important wildlife species sensitive to the proposed management treatments. These species include lynx, wolverine, grizzly bears, and wolves, as recognized in the Environmental Assessment. This project's long-term (10 yr.) timeline will result in significant, long-lasting displacement of sensitive species.

III. Proposed whitebark enhancement treatments that contain no whitebark
Whitebark enhancement treatments are proposed in areas below 8,700' in elevation that contain no whitebark (Fig A.3, A.4 A and B). How can these be justified on any management criteria based in "best science?"

I have skied (or at least attempted to) through this area many times, and it is a dog-hair monoculture of 1988 post-fire regeneration lodgepole pine. Although I admit there could be whitebark understory covered by snow, local friends who visit this area during summer confirm the lack of understory whitebark.

Even if occasional whitebark seedlings/saplings occur in the understory of these treatment polygons, what is their chance of reaching cone-bearing age? Peer-reviewed science (see Section I above) indicates the climate-driven trajectory of these forests is to early serial lodgepole regardless of management intervention. This evidence spans the Holocene and reinforces best science model projections within a 100-year planning framework (see Section I).

IV. Daylighting has not been demonstrated to be effective
Daylight thinning treatments are designed to remove competing species, so-called daylighting. The efficacy of such treatments is largely undocumented and unsubstantiated. While the peer-reviewed literature documents whitebark growth release following such treatments (Retalaff et al. 2018, Kichas et al. 2024), there has typically been no follow-up monitoring to evaluate long-term effects such as recruitment or increased Clark's nutcracker caching.

The supporting EA At Risk Effects Analysis is rife with vague references to expected results with no supporting documentation. The only peer-reviewed reference is Keane et al. (2022). In one of the few studies evaluating treatment effects, Maher et al. (2018) found variable growth response, stating, "While some management goals were achieved, many were not, and there were some unintended consequences."

The proposed treatment's objective is to remove competing conifers, and in the designated polygons, that means almost exclusively removing subalpine fir. (Sec. I). Subalpine fir and whitebark have co-existed successfully in these forests for centuries. However, the major threats (US Fish and Wildlife Service, FWS) of white pine blister rust (WHITE PINE BLISTER RUST) and mountain pine beetles (FWS 2021) will not be affected by treatments, and in fact, increasing air movement through the stand may increase the risk of infection by the aerial dispersed WHITE PINE BLISTER RUST spores.

While the positive impacts of daylight treatments are speculative, the collateral damage of such treatments is unambiguous. These deleterious impacts include the direct effect of mechanical disturbance acknowledged in the EA At-Risk Effects Analysis but also include the potential for treatments to accelerate the replacement of whitebark by other conifers, namely lodgepole pine and subalpine fir. Maher (2018) found strong evidence that treatments increased recruitment of competing conifers. An abundant seed source for the aerially dispersed lodgepole pine seeds is close to the proposed treatment blocks (Fig. A.3).

One hundred ninety-eight acres of whitebark were thinned in the Cooke City Whitebark Pine Project following the 1988 fires. Another recent (2011) whitebark treatment project occurred in the Fisher

Creek drainage. No efficacy evaluation has been made for either of these projects, and yet, a larger, more ambitious whitebark enhancement project is proposed for the same area. At the very least, a comprehensive evaluation of the results from this previous project needs to be made.

V. Inadequate treatment of a rapidly warming climate
Climate warming is the ultimate driving factor for the elevational displacement of whitebark as conditions become more favorable for competing conifer species. Significant displacement of whitebark is projected to occur within a 100-year management framework, which may be already occurring (Lenoir 2008, Greenwood and Jump 2014 and references therein). The significant impact of climate warming is not so much the intolerance of whitebark to warm temperatures but the release of constraining conditions for competing conifers (McCaughey et al. 2009). In other words, its distribution is determined not by where favorable conditions exist for whitebark, but where climate conditions are unfavorable for competing conifers.

In many circumstances, climate warming and increased favorability to outbreak populations of mountain pine beetle play the dominant role in whitebark decline (Jules et al. 2016, Maher 2018 a, b) found that mountain pine beetle mortality vastly exceeded white pine blister rust[1] mortality (86% to 14%, respectively) in his study plots located in Montana, Idaho, and Oregon. In the Greater Yellowstone Ecosystem, the recent outbreak resulted in 70% mortality of cone-bearing whitebark (Thom et al. 2019).

Expansion of mountain pine beetle outbreak populations into high-elevation whitebark pine habitats is one of the first examples of a modeled prediction of climate warming impacts that played out almost exactly as predicted (Logan and Powell 2001, Logan et al. 2010, Macfarlane et al. 2013). Once established, and with continued climate warming in the foreseeable future, continued episodic outbreaks of mountain pine beetles are projected to intensify, impacting an increasing proportion of whitebark's current distribution. By mid-century, climate conditions over most of the current whitebark distribution will be as favorable for mountain pine beetles as during the catastrophic outbreaks of the early 2000s (Boutte et al. 2016, 2017).

Whitebark vulnerability to mountain pine beetle attack at least partly results from maladaptive chemical defenses. The resin composition of whitebark is precisely backward, high in those chemicals that the beetle uses to focus attack and lacking those that defend the tree from attack. (Logan et al. 2010, Raffa et al. 2013; 2017). Rather than evolve effective defensive defenses, whitebark's adaptive strategy has been avoiding competition and insect pests by occupying climatic regions that are too harsh for either (see section I. above).

Management actions that disregard the climate-driven elevational plasticity of whitebark, accelerated by climate-released insect pests, cannot be claimed to be consistent with the requirements of the best science.

Conclusions and Recommendations
Lack of adequate consideration of the negative impacts of the proposed whitebark enhancement treatments combined with the overly optimistic statement of their benefits has resulted in an

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White pine blister rust is identified as the "existential" threat by FWS (2022).

egregiously flawed Environmental Assessment. The far-reaching implications of the proposed work warrant conducting a full Environmental Impact Statement that includes evaluating the Fisher Creek treatments.

The purpose of enhancement treatments in this project is to maintain the current range of whitebark forests into the foreseeable future. Historical evidence, recent research, and model predictions indicate a more likely trajectory regardless of treatment: displacement of whitebark from its current distribution by other, competitively superior conifers and range expansion of whitebark into higher elevation habitats near or above the current treeline. A full Environmental Impact Statement is needed that considers alternative approaches, including aggressive planting (or seeding) blister rust-resistant whitebark near or above the current treeline. i.e., assisted migration (Palmer and Larson 2014, McLane and Atkins 2012).

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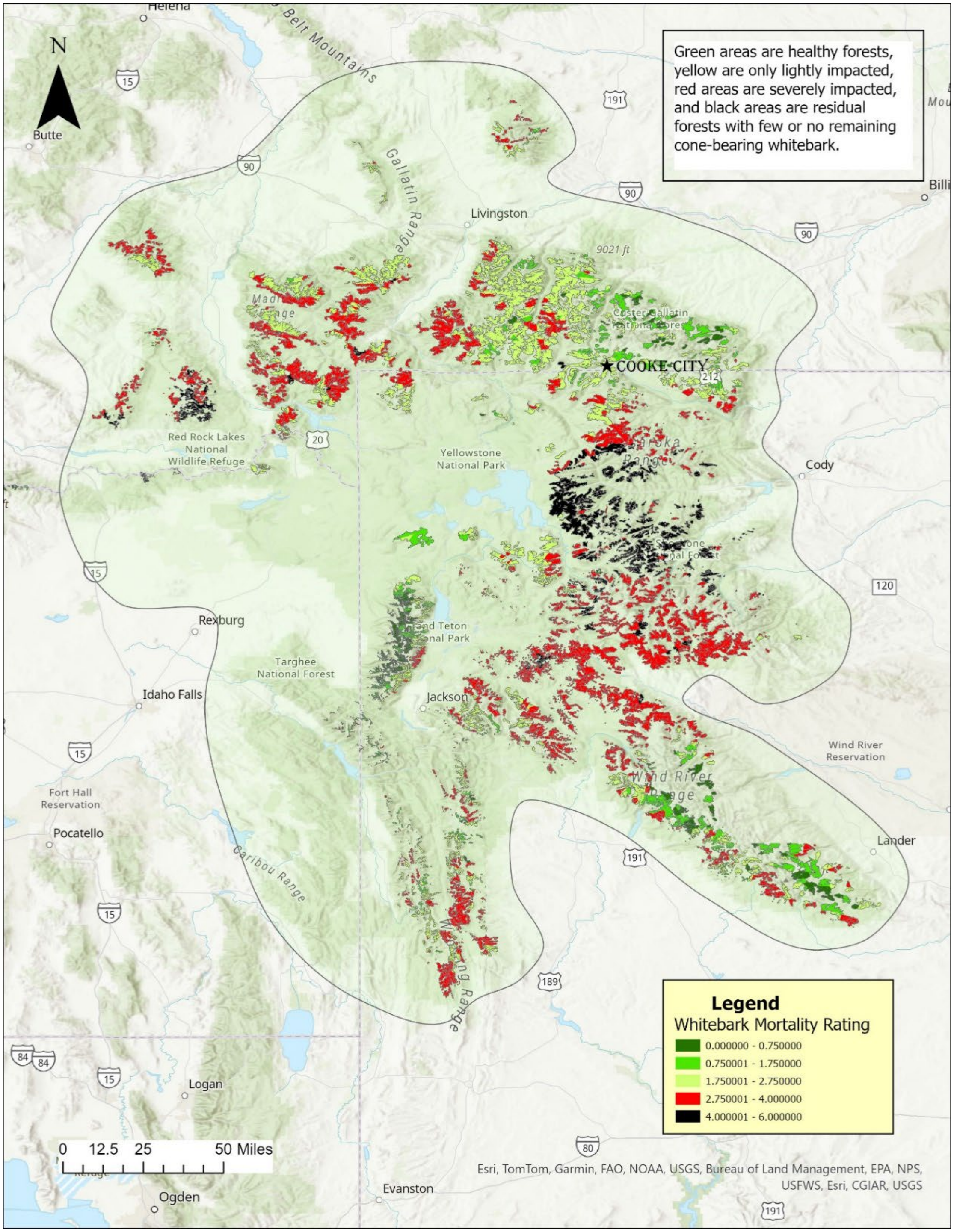
ATTACHMENT 1. FIGURES



A.1. From Macfarlane et al. 2013

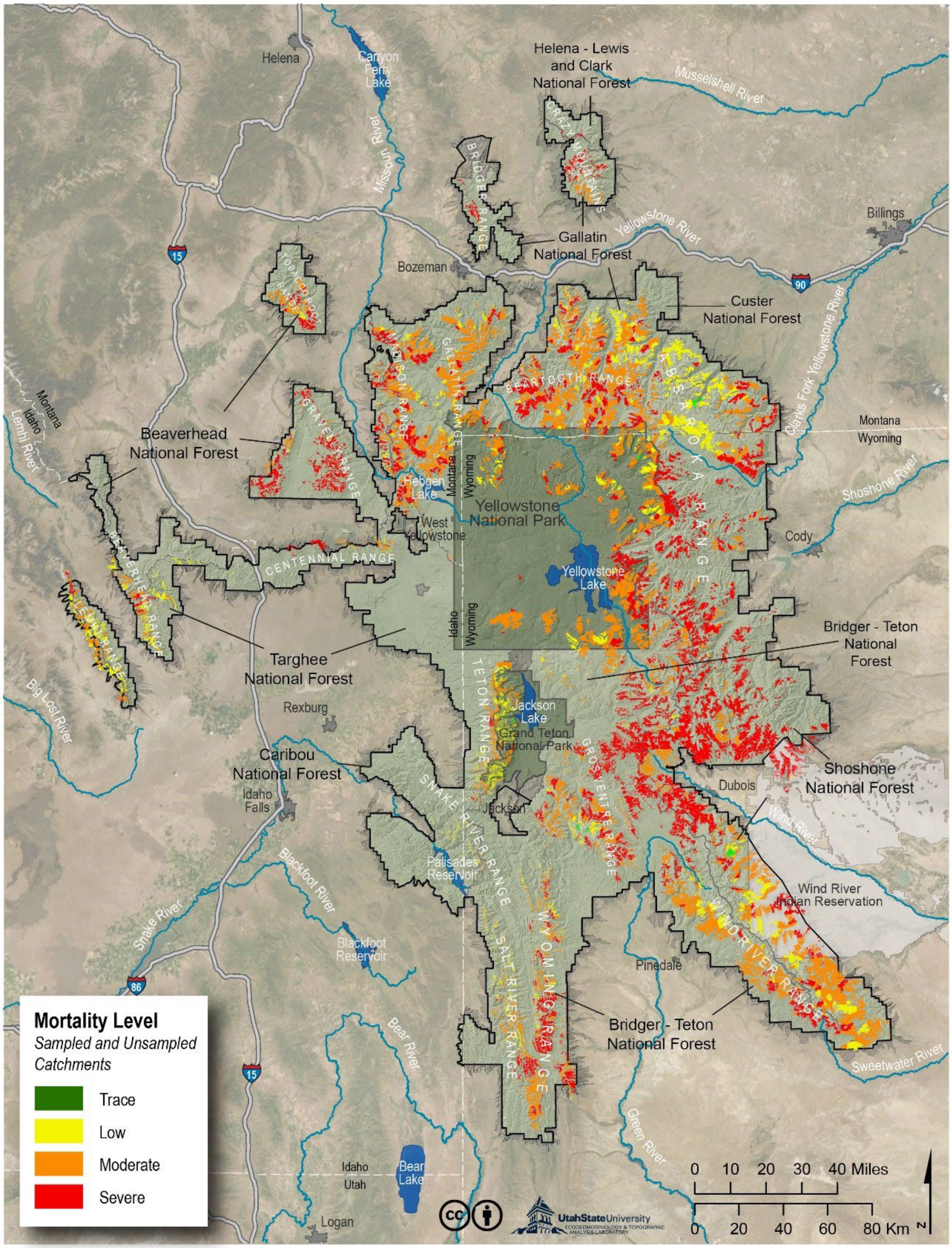


Fig. A.2. From Macfarlane et al. 2023

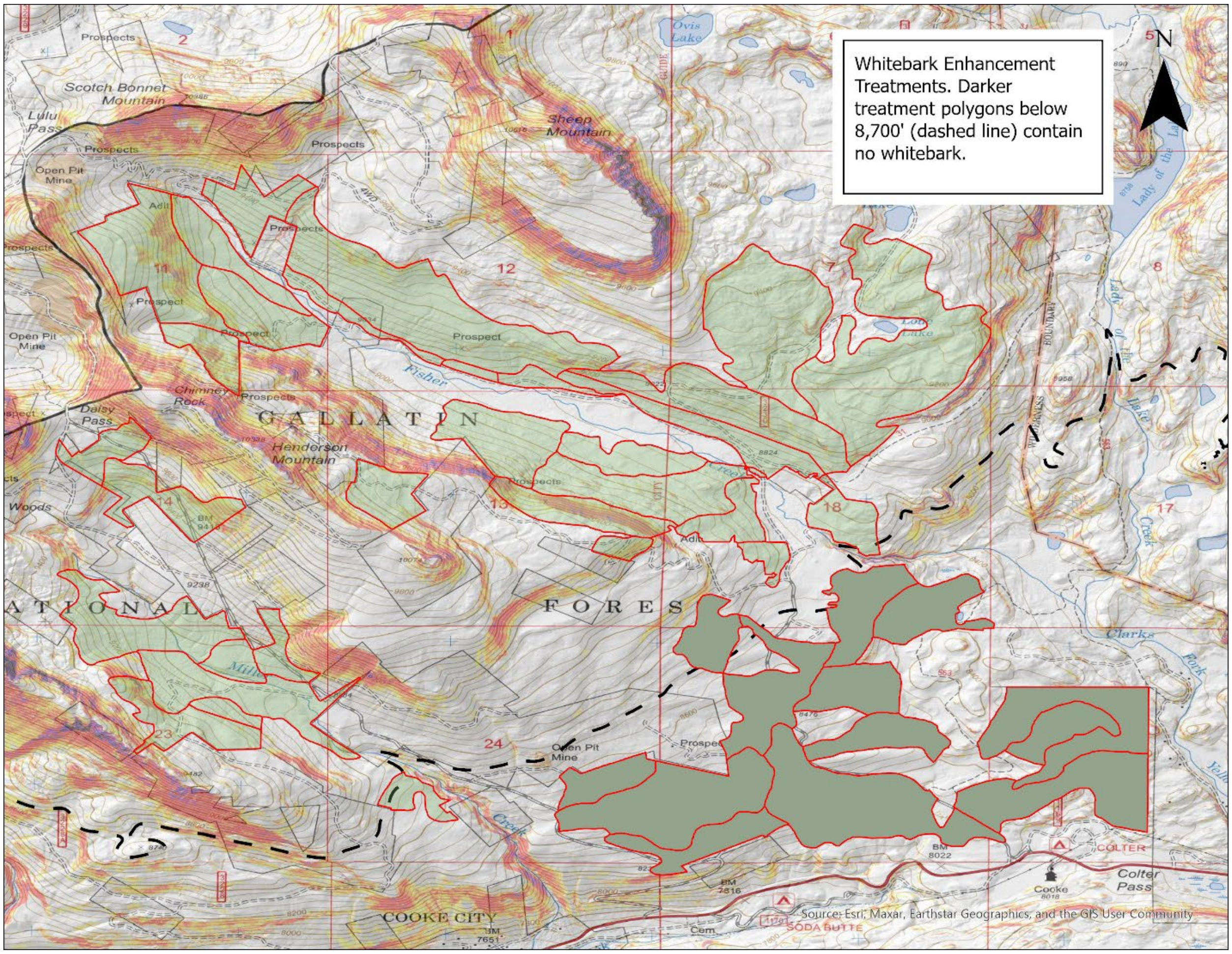
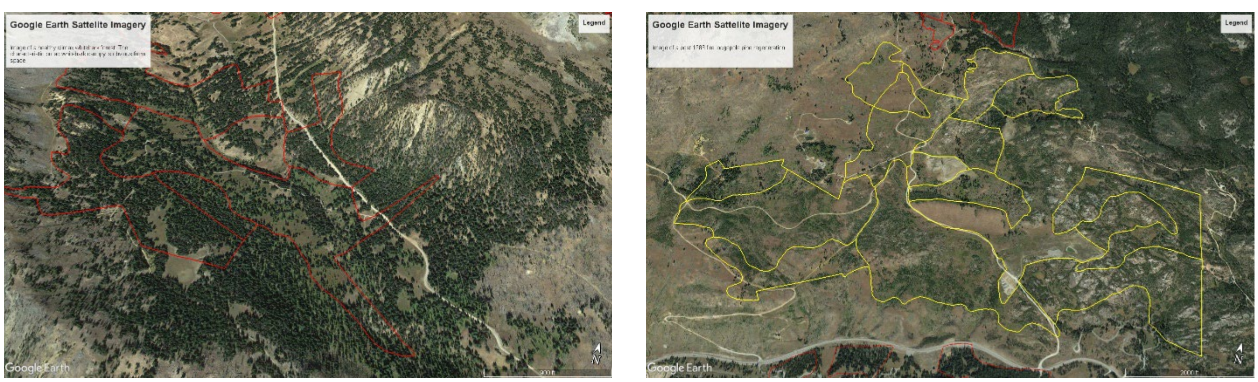


Fig. A.3 Whitebark enhancement treatments 3, 5-9, 11-13, 15, and 109 A, B contain no whitebark in either the overstory or understory.



A. **B.**

Fig. A.4. Google Earth satellite imagery that shows the obvious difference in appearance between a healthy climax whitebark forest on the left (A) and a fire-regenerated dog-hair lodgepole forest on the right (B).

Attachment 3 Request for Scoping of the Fisher Creek Project

Request for Public Scoping Comments Fisher Creek

Whitebark Pine Project
Park County,
Montana Gardiner
Ranger District
Gallatin National
Forest USDA, Forest
Service

March 10, 2010

Dear Interested Party:

The Gardiner Ranger District of the Gallatin National Forest is asking for public comment regarding a proposal to maintain and enhance whitebark pine forests on about 300 acres in the Cooke City area, specifically in the Fisher Creek Drainage. This document includes a description of the proposal and its intended purpose, some background information and information on how to comment.

Proposed Action and Purpose of and Need for Action

The Gardiner Ranger District of the Gallatin National Forest is proposing to implement silvicultural treatments on about 300 acres of forest with the objective of maintaining and enhancing whitebark pine trees. The proposed treatments are located 3 miles north of Cooke City, Montana, in the Fisher Creek Drainage (see vicinity and whitebark maps). This area is part of the Custer National Forest which is administered by the Gallatin National Forest. Treatments and follow-up monitoring would be implemented as funding is available.

The proposed action involves prescriptive treatments (see table below) in both mixed species forested stands and mostly pure whitebark stands, along with the use of either verbenone (a natural mountain pine beetle repellant that comes in a pouch) or carbaryl (an insecticide that is sprayed on the trees) to deter attack by mountain pine beetles. We are also proposing to use carbaryl to protect healthy trees along the Henderson Mountain Road. Funding for the use of carbaryl and/or verbenone is available for use starting in July 2010.

The purpose is to reduce competition from other tree species and therefore promote whitebark pine, and to create conditions (openings) favorable for regeneration of whitebark pine and unfavorable to mountain pine beetle attacks (thinning to 80 square feet of basal area for example).

The project involves no road construction. The project area is in Management Area (MA) 15 (Gallatin National Forest Plan), which includes areas in occupied grizzly bear habitat which provide opportunities for dispersed recreation and livestock use. The management goal for MA-15 includes management of vegetation to provide habitat needed to recover the grizzly bear.

Implementation of the project will involve Forest Service personnel to oversee the project and either Forest Service crews or contractors to fell trees, pile slash, and burn piles or conduct prescribed burning, as well as hang verbenone pouches. Any carbaryl treatments will be implemented by a certified contractor.

Condition	Prescription	Objective
Dense mixed canopy of whitebark pine and subalpine fir	Thin subalpine fir and pile slash in small openings; burn in the fall	Eliminate the faster growing subalpine fir from competing with the slower whitebark pine.
Moderate canopy cover of subalpine fir and whitebark; about 50% existing whitebark pine is dead	Put enough fuel (subalpine fir and dead whitebark) on the ground to create a fuel bed that will carry fire and create ½ ac openings	Provide a site where whitebark pine seedlings can begin to establish
Pure and mostly healthy WBP but very dense canopy cover	Thin to 80 Basal Area; pile and burn slash	Reduce the risk that the remaining WBP will be killed by mtn. pine beetle
Dominant whitebark with some subalpine fir	Drop the subalpine fir but don't burn; apply beetle repellent	Eliminate the faster growing subalpine fir from competing with the slower growing whitebark and to repel mtn. pine beetle attacks.
Subalpine fir/Whitebark/Huckleberry Habitat type	Selective thinning	Reduce subalpine fir competition and to reduce white pine blister rust infection
Old growth whitebark pine with pockets of beetle hit and blow down	Protect existing healthy trees with verbenone or carbaryl	Repel future mtn. pine beetle attacks on treated whitebark
Avalanche stringers of mixed species	Slash species other than WBP, and use Rx fire to treat slash	Eliminate the faster growing subalpine fir from competing with the slower growing whitebark

Background

Across the Greater Yellowstone Ecosystem (GYE), whitebark pine mortality rates have been rapidly increasing from the combination of white pine blister rust and mountain pine beetle attacks. As a result, vegetation ecologists from across the area, known as the Greater Yellowstone whitebark pine subcommittee, undertook the task of compiling an ecosystem-wide whitebark pine distribution map, developing prioritization criteria, and mapping the areas that are the highest priority for restoration (planting or other active management) as well as protection (from fire or insects etc). The mapping is complete and shows that the Cooke City area is a high priority for both restoration and protection.

The Fisher Creek drainage was selected due to several factors. First, it has existing road access needed for the effective implementation of the treatments identified by the Forest Silviculturist and Forest Ecologist. Second, it has a combination of different stand conditions, both pure and mixed whitebark pine, and a relatively low-moderate rate of blister rust infection and mountain pine beetle-caused mortality at this time.

Silvicultural treatments were designed, based on field review in 2009, to promote conditions for healthy whitebark pine forests by reducing competition from other forest species, creating openings for Clark's Nutcrackers (a jay-like bird on which whitebark trees depend to disperse and bury seeds) to plant seeds, and to thin dense whitebark to a density where mountain pine beetles are less likely to be successful in attacking healthy trees.

Reason for Categorically Excluding this Action:

A preliminary analysis of the project and its associated effects has been completed. The action can be categorically excluded from documentation in an EA or EIS under Category 31.2 #6, "Timber stand and/or wildlife habitat improvement activities which do not include the use of herbicides or do not require more than one mile of low standard road construction" (FOREST SERVICE H 1909.15).

In addition to meeting the criteria as described in FOREST SERVICE H 1909.15 Chapter 30.3(2), the preliminary assessment completed by the interdisciplinary team indicates that no impacts to resource conditions are anticipated that would lead to a finding of extraordinary circumstances that might cause the action to have significant effects.

Prior to a final decision, additional specialist review of public comments will occur to ensure that there are no unforeseen impacts to soil, water, wildlife, fish, or other resources.

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Attachment 4 District Ranger Maj, responded to Fisher Creek Project Scoping comments

USDA United States Department of Agriculture | Forest Service | Gallatin National Forest | Gardiner Ranger District
P.O. Box 5
Gardiner, MT 59030

File Code: 2600/2020
Date: July 19, 2010

Dr. Jesse Logan
P.O. Box 482
Emigrant, Montana 59027

Thank you for responding to the Fisher Creek Whitebark Pine Project public scoping this past spring. We have decided to postpone further NEPA analysis to take the time to further develop the project with any and all stakeholders.

We received 4 comment letters and emails. Comments received suggested an interest in greater clarity of objectives and proposed treatment methods. We intend to examine and respond to the suggestion of a "control", current whitebark pine regeneration, existing stand conditions, and wildlife habitat use and the larger landscape context.

As a first step in refining objectives and treatments, I am inviting interested parties, as well as members of the GYCC whitebark pine subcommittee, to join myself and several Gallatin National Forest staff to a field review of the project area. The objective of the field review will be to gather ideas and suggestions about whitebark pine restoration in this area. As documented in our scoping document, the Cooke City area is suitable as a place to start whitebark pine restoration on the Gallatin National Forest due to accessibility, the relatively healthy condition of stands, and the partnership with New World Mine to further improve natural resources in the area. We will also discuss what is known about whitebark pine response to various stand treatments, fire and pathogens, as examples in the Greater Yellowstone.

Please let us know if you are able to join us August 12, 2010 for a field review of our proposed whitebark restoration project. We will meet in Cooke City at the Community Visitor Center at 10:00AM for a short project review and then carpool to the field for a full day. Please come prepared with field clothing and boots, water and lunch.

We look forward to our collective discussion and examination of the Fisher Creek Whitebark Pine project area. Please RSVP by August 6 by calling Jodie Canfield at 406-587.6739 or myself at 406.848.7375 ext 24.

Sincerely,

Mary Maj

MARY MAJ
District Ranger

Attachment 5 Field Notes from Fisher Creek field trip.

Fisher Creek Whitebark Pine field review NOTES

August 12, 2010

Participant List:

Willie Kern
John Oldemeyer
Wally Macfarlane
Jesse Logan
Dan Reinhart
David Gonzales
Roy Renkin
Whitney Leonard
Scott Christensen
Hanna Stauts
Jodie Canfield
Mark Novak

Overview: GYA whitebark pine strategy forthcoming showing high priority restoration and protection throughout the ecosystem. AB mountains and Winds show most resilience to mtn pine beetle currently. Cooke City area is unique in that 1) there is still a high proportion of green overstory; 2) there is road access; not wilderness; 3) there is a variety of stand conditions represented. Gallatin proposed about 300 acres of various silvicultural treatments and received comments – decided to back off and have collaborative conversations with stakeholders to try and better frame the options and ideas.

STOP 1 – Avalanche chute area (patches of beetle killed mature wbp between avalanche chutes)

- Is there any value in removal of dead wbp to create openings for caches
- Need some threshold of cone production for nutcrackers; nutcrackers don't discriminate with respect to blister rust and hence are planting non –resistant seed
- Rust is a long-term threat; mpb is changing the world of whitebark in real time
- Possible that wbp has resistance to beetles; maybe we will find Plus trees for beetles?
- Mid-elev regime is most resistant to beetle attacks
- Unknown if trees in the understory release after overstory dies (Roy – has data from Blister Rust study plots in Glacier)

STOP 2 – Mixed wbp and subalpine fir (Abla)

- Original idea was to reduce Abla and make wbp more competitive; create donut holes around the wbp

- Question: is the Abla negatively impacting the wbp?
- Fire regime?
- Is it ok in some areas to let wbp be the nurse trees?
- Might have 3 options here – control (natural openings); create openings; leave closed forest; control for slope, aspect, soils
- Focus on reducing competition around the pole size wbp (the next trees to produce cones)
- Can't make the assumption that wbp will behave here as Keane's research showed for western MT.
- Curious about the demography in mid-elev rhyolitic soils where wbp and lpp are cohorts (graduate project – see Roy)
- Squirrels are living in mixed stands and provide middens for bears, but pure stands provide the excess seed for caching and dispersal. Need to look at this from a landscape perspective. Bear use here is highly related to the cone crop.
- Do we want to work in healthy forests or focus on the unhealthy forests?
- Get Barbara Bentz and research silviculturists involved in a design
- Track temperature with hobo devices in relation to elev, slope, treatment type

STOP 3 – pure WBP

- Can you remove the "faders" (this year's attacked trees) and keep beetles from flying?
- Is this epidemic surpassing the mortality of the 30's? Jesse thinks that this epidemic is taking out large and smaller diameter trees, especially in the southern end of the ecosystem; Roy argued that Washburn in the 30's is similar to Avalanche Peak today.
- This represents a functional loss – not extinction
- Don't thin pure wbp
- Verbanone pushes the beetles to other trees. Could we then trap the beetles?
- Jose Negron (RMRS in Fort Collins) has done some work on this…burn, debark, shrink wrap brood trees. New thesis from Barbara Bentz student using push pull methods in the GYE.

STOP 4 – lower elevation mixed stands

WBP is selected by beetles in mixed lodgepole/wbp stands (thicker cambium); could remove Abla, but try to manage as a mixed stand (create small openings)

SUMMARY ENDING

- Establish treatments and controls
- Find metrics that can be monitored in real time and then long-term look at recruitment
- Track temperatures

- Track overstory mortality and some index of health
- Track cone production
- Identify beetle resistant trees

Graduate project?
Keep it collaborative!

Attachment 6 Proposal for Whitebark Pine FY 2011 Restoration Project

PROPOSAL FOR WHITEBARK PINE
FY 2011 RESTORATION PROJECT FUNDS
Due December 6, 2010

Using the following format, briefly describe the proposed project (do not exceed 3 pages). *Submit electronically to John Schwandt* (jschwandt@Forest Service .fed.us)

Project Title: Cooke City Whitebark Pine Project

Focus Area: (from cover letter) Enhancing Regeneration and Reducing Competing Vegetation; Special Projects

Location: Whitebark pine forests, near Cooke City, Gardiner Ranger District, Gallatin NF

Size of treated Area (Ac, trees, etc/NA); 300 acres; 150 of treatment; 150 control

Project Contact: (Name, Affiliation, Address, Phone number, e-mail) Mark Novak, Forest Silviculturist (mnovak@Forest Service .fed.us; 522-2560) and Jodie Canfield, Forest Wildlife Biologist (jecanfield@Forest Service .fed.us; 587-6739).

Objective(s): 1) Identify the site variables that determine the differences in blister rust infection and mountain pine beetle infestation rates in whitebark pine forest types throughout the GYE. 2) Exam how blister rust and mountain pine beetle mortality rates are affected by different climate regimes as well as by removal of competing subalpine fir and lodgepole pine. 3) Determine how the ecological assemblage of red squirrels, Clark's nutcrackers, and grizzly bears are affected by converting mixed stands of whitebark pine to a more pure whitebark forest type.

Scope: (applicability to broad restoration goals) Recent comprehensive evaluation of whitebark pine mortality in the Greater Yellowstone Ecosystem shows several areas of relative health, including this area on the Gardiner Ranger District, in spite of surrounding areas being affected by mountain pine beetle and blister rust. In conjunction with Montana State University, this project would address some range-wide questions about the relative resistance of whitebark to both agents, test the idea that under some climate change scenarios, the generally cooler, E-NE aspects that are now spruce-fir dominant with only a minor WBP component might become increasingly favorable WBP habitat by doing treatments (mechanical and/or fire) on the cooler, more mesic NE aspects. The study would also examine the wildlife relationships in an area with both mixed and pure whitebark pine, which is both a range-wide as well as a landscape issue in the GYA (because of Grizzly Bears).

Approach/Methods: (brief outline of methods) A fully replicated factorial design with aspect, slope location, open, beetle-killed, and green /healthy whitebark, treated (remove competing species) and untreated units.

Basic Timeline of Activities: Field Seasons 2011-2013

Expected Results/Products/Outcomes: The study would generate some information relative to the hypothesis is that local microsite conditions, as well as landscape conditions affect the relative resistance of whitebark to mountain pine beetle infestation and blister rust infection, and relative to the relationships of key wildlife species in mixed versus pure whitebark pine stands.

Cooperators: (Name and affiliation of others taking an active role in project) Montana State University, Yellowstone

National Park, Jesse Logan, retired RMRS entomologist, Greater Yellowstone Coalition, Natural Resources Defense Council, New World Mine restoration project.

Funding Requested: (estimate: Salary, Travel, Supplies, Other)
Estimate Other Contributed or Matching Funds: (List amount and source; include in-kind contributions)

Item	$ Requested	Other Source $	Description
Salary	20K	20K	Stipend for MSU PhD student; New World Mine matches FHP.
Travel		15K	Vehicle and Housing provided by Gallatin NF
Supplies/Equipment	5K		Temperature monitoring equipment
Contracting		10K	Gallatin NF for silvicultural treatments
Other (specify)			
Total	**25K**	**45K**	

Summary of pre-treatment monitoring for Cooke City Whitebark Pine restoration project

Prepared by Teresa Lorenz[1]

December 8, 2011

Introduction

Whitebark pine (*Pinus albicaulis*) is a declining keystone species that occurs in high elevation and subalpine environments in the mountains of western North America. It produces large seeds that are valued by wildlife for food. Few seeds escape being consumed or stored by at least one species, and the importance of vertebrate seed-eaters cannot be overestimated as they exert more influence on regeneration than perhaps any other factor. In fact, whitebark pine relies on a songbird, Clark's nutcracker (*Nucifraga columbiana*), for seed dissemination and consequently, population-wide regeneration. In July 2011, whitebark pine was listed as a candidate species under the Endangers Species Act (ESA) because of repaid declines attributed to an exotic disease, white pine blister rust (caused by the fungus *Cronartium ribicola*), mountain pine beetle (*Dendroctonus ponderosae*) outbreaks, fire suppression, and climate change. To improve stand health and increase opportunities for regeneration, researchers advocate the use of mechanical thinning to cull competing vegetation. The immediate benefits of such restoration activities for individual whitebark pine trees are readily apparent, but the effects of such treatments on overall stand health and the seed-eating vertebrate community have not been previously studied using a before-after control-impact design. The objectives of this project were to monitor whitebark pine health and autumn cone production, as well as rodent and nutcracker abundance in response to such restoration treatments.

Study objectives

Within this broad objective, our study questions included:

1 – Does thinning increase the vigor of whitebark pine trees, and is this realized in an increase in regeneration at the stand-level?

2 – How do restoration treatments affect autumn cone production, and does cone production vary among trees in stands with different aspects, elevations, and pre-treatment stand densities?

[1] College of Natural Resources, University of Idaho, Moscow, ID 83844. lore5748@vandals.uidaho.edu

– Do more nutcrackers visit the treated sites compared to untreated sites? Are their specific vegetative features that are associated with their abundance during the autumn seed harvest season?

3 – What is the composition of the small mammal community in whitebark pine ecosystems, and how do small mammals respond to restoration treatments?

Study area

This study is being conducted in the Fisher Creek drainage of the Gallatin National Forest, near Cooke City, MT (approximately 45˚ 01' 11" N, 109˚ 65' 03" W). Within Fisher Creek, we stratified our experimental design by aspect, with one group of units (Henderson) facing generally north, and the second (Sheep Mountain) facing south. We further divided Sheep Mountain into blocks by elevation, because of considerable variation in elevation across the plot (Figure 1). Consequently, the Henderson site contains four study units and the Sheep Mountain site six units. For each adjoining pair of units, we randomly assigned the treatment (mechanical thinning; Table 1) or control (no treatment). Thus there are five units that will be treated with mechanical thinning, and five units that will not be thinned. These ten study units represent our experimental units and are of approximately equal area (Table 1).

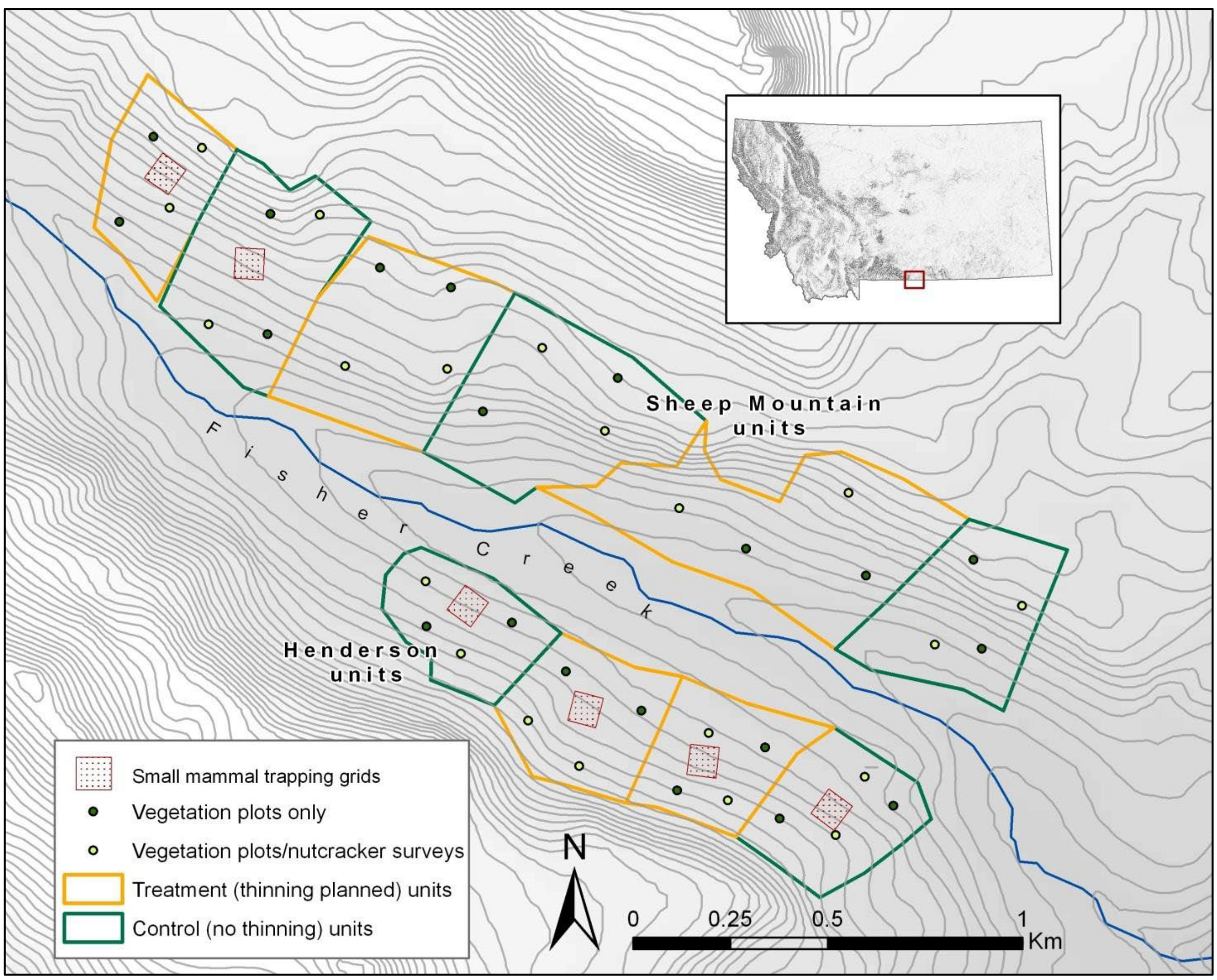

Figure 1. Map of project units for whitebark pine restoration in Fisher Creek, MT. 2

Table 1. Summary of aspect, treatment type, and size for 10 whitebark pine restoration units in Fisher Creek, MT.

Site	Unit	Aspect	Proposed treatment	Area in ha(acres)
Henderson	east a	north	thin fir and spruce	14.2 (35.1)
	east b	north	control – no thin	15.2 (37.6)
	west a	north	control – no thin	15.6 (38.6)
	west b	north	thin fir and spruce	13.9 (34.3)
Sheep Mountain	east a	south	thin fir and spruce	14.9 (37.0)
	east b	south	control – no thin	20.6 (51.1)
	mid a	south	thin fir and spruce	21.7 (53.8)
	mid b	south	control – no thin	20.6 (50.9)
	west a	south	thin fir and spruce	15.3 (37.9)
	west b	south	control – no thin	17.3 (42.9)

Methods

Our study objectives require monitoring both pre- and post-treatment. Our pre-treatment monitoring occurred in September 2011, and post-treatment monitoring is planned for 2012 and 2013. The treatment is being implemented from October 2011 through August 2012 and consists of thinning (or girdling for very large trees) of non-whitebark pine trees surrounding all sapling and adult whitebark pines.

Our monitoring efforts can be lumped into three general categories: (1) **vegetation surveys**, (2) nutcracker and squirrel **occupancy modeling**, and (3) **small mammal trapping**.

(1) We are using **vegetation surveys** to characterize the structure and composition of the plant community within units. Surveys are being conducted at four random plots within each unit, and at five plots within each small mammal trapping grid (see below), for a total of 80 vegetation plots surveyed each year. Using point-center quarter methods (Cottam and Curtis 1956), we are measuring shrub and ground cover, canopy cover, density of saplings and trees, and white pine blister rust infection rates for whitebark pine trees. We are also conducting cone counts on 16 randomly selected whitebark pine trees in each plot.

(2) Two of the vegetation survey plots mentioned above are also locations for **occupancy surveys** for Clark's nutcrackers and pine squirrels (*Tamiasciurus hudsonicus*), the two most influential seed eaters in whitebark pine communities. Occupancy modeling is a recent and important tool for monitoring of vertebrate populations, and it enables more reliable estimates of density than distance sampling alone (MacKenzie et al. 2006). During these surveys, we note the presence and abundance of all audible and visible nutcrackers and squirrels. By measuring vegetation and whitebark pine cone abundance at these same points, we will be able to relate nutcracker and squirrel abundance not only to the treatment effects, but also to more site-specific, vegetative factors.

(3) We are using mark-recapture techniques to estimate the relative abundance of small mammals in the units, and to determine whether the composition of the rodent community will change in response to the treatment. Our **small mammal trapping** grid consists of

25 Sheman live traps set at 10 m spacing, and grids are set approximately in the center of units.

Pre-treatment monitoring results

Vegetation surveys

Prior to thinning the units, we found slightly higher amounts of grass and bare soil on south-facing pots, and higher cover by moss on north facing plots (Table 2). This is likely due to differences in moisture retention and evaporative loss between the aspects. We found little difference in vegetation or ground cover by proposed treatment type, and controls and treatments had nearly identical cover by all measured covariates (Table 2).

Table 2. Pre-treatment mean (standard deviation) cover by vegetation (forbs, grasses, and shrubs) and ground cover (coarse woody debris (cwd), litter, moss, rock, and soil) for whitebark pine restoration plots at Cooke City, MT, by aspect and treatment type.

	Forb	Grass	Shrub	Cwd	Litter	Moss	Rock	Soil
Aspect								
North (*n*=4)[1]	29.9 (8.8)	1.4 (0.4)	33.9 (2.0)	19.1 (2.8)	52.5 (11.7)	20.2 (10.9)	7.5 (5.5)	0.9 (0.9)
South (*n*=6)	20.2 (8.9)	10.1 (7.8)	45.2 (14.5)	13.7 (7.2)	65.4 (10.5)	10.3 (12.5)	2.6 (1.7)	7.7 (4.7)
Proposed treatment type								
Treatment (*n*=5)	25.6 (10.5)	6.6 (7.5)	38.3 (10.2)	15.5 (6.8)	60.0 (12.1)	16.1 (14.1)	3.9 (1.0)	4.4 (5.1)
Control (*n*=5)	22.5 (9.9)	6.5 (8.0)	42. 9 (15.0)	16.3 (6.3)	60.5 (13.9)	12.4 (11.7)	5.2 (6.2)	5.6 (5.3)

[1] *n* refers to the number units rather than the number of vegetation survey plots within units; there are four to eight vegetation survey plots within each unit

Density of whitebark pine trees was higher for units with a southerly aspect (14.1 trees/ha for southern aspects versus 1.0 trees/ha for northern aspects), and higher for the treatment units (13.7 trees/ha for treatments and 4.0 trees/ha for controls), although these differences were not significant (p = 0.1895 and 0.4033, respectively) (Table 3). The difference in

Table 3. Pre-treatment density of trees, whitebark pine cones, and whitebark pine trees infected by blister rust for units in Fisher Creek, by aspect and treatment type.

Site	Unit	Proposed treatment	Subalpine fir density (trees/ha)	Engelmann spruce density (trees/ha)	Whitebark pine density (trees/ha)	Whitebark pine cone density (cones/ha)	White pine blister rust density (trees/ha)
Henderson (north aspect)							
	east a	treatment	19.0	14.8	< 1	< 5	<1
	east b	control	11.5	2.9	1.0	15	1
	west a	control	13.6	11.9	< 1	< 8	<1
	west b	treatment	19.6	2.8	< 1	< 6	<1
Sheep Mountain (south aspect)							
	east a	treatment	29.7	8.1	5.4	83	1
	east b	control	24.0	15.0	9.0	114	0
	mid a	treatment	8.1	3.0	4.0	13	1
	mid b	control	8.9	4.0	3.0	87	2
	west a	treatment	11.4	22.8	57.0	445	0
	west b	control	12.1	14.1	6.1	55	0

whitebark pine density due to treatment type was attributed to a high density of whitebark pine trees on one vegetation plot on one treatment unit (Sheep Mountain west a). By omitting this one plot from the data set, the density of whitebark pine trees for treatments and controls was nearly identical (2.9 trees/ha for treatments and 4.0 trees/ha for controls). We found no significant differences in cone density or white pine blister rust density by aspect or proposed treatment type.

We intended to measure whitebark pine mortality and infections rates from mountain pine beetle, but the distribution of beetle infected and killed trees was highly clumped. Thus, the variation in beetle infected trees was very high even within units, precluding an accurate assessment of the density of infection by unit. For example, we encountered 17 infected or recently dead trees, but 16 of them occurred on only one plot within a unit, with the other plots containing no infected trees. Data from remote sensing or aerial surveys are likely to estimate beetle mortality much more accurately than our on-the-ground vegetation plots.

Occupancy surveys

We completed a total of 600 minutes of surveys on 20 plots for Clark's nutcrackers and pine squirrels. Nutcrackers accounted for 81% of all detections (178 total detections), but only 58% (104 detections) of those detections were actually within the study unit boundaries (Table 4). The remainder of nutcracker detections were of birds flying overhead or outside the study area boundary and were exclude from all analyses. Pine squirrels accounted for nearly all of the remaining detections (17% of detections, or 37 total detections), with only 4 chipmunks detected across all surveys.

We found no differences in squirrel or nutcracker detections by treatment type ($p = 0.6065$ for squirrels and 0.8296 for nutcrackers) or aspect ($p = 0.3685$ for squirrels and 0.9475 for nutcrackers). We likewise found no strong correlations between nutcracker detections and any measured stand characteristics; indeed, the correlation between nutcracker detections

Table 4. Pre-treatment mean number of pine squirrels, Clark's nutcrackers, and chipmunks detected during 10-minute point counts in each unit.

Site	Unit	Proposed treatment	Pine squirrel	Clark's nutcracker	Chipmunk
Henderson (north aspect)					
	east a	treatment	0.7	1.5	0.0
	east b	control	1.2	2.5	0.0
	west a	control	0.8	1.7	0.0
	west b	treatment	0.5	1.2	0.2
Sheep Mountain (south aspect)					
	east a	treatment	1.5	3.3	0.3
	east b	control	0.5	0.5	0.0
	mid a	treatment	0.0	1.3	0.0
	mid b	control	0.7	2.8	0.0
	west a	treatment	0.0	1.7	0.0
	west b	control	0.3	0.8	0.2

and whitebark pine cone density was particularly weak ($r = 0.0094$). This is not necessarily surprising, for even though we expect that nutcrackers would be attracted to cones, they are non-territorial, mobile, and gregarious when harvesting cones, making it difficult to accurately predict their abundance using standard survey methods. Rather, occupancy models would provide a better estimate of nutcracker response to cone production, and treatment type. We hope to complete analyses of nutcracker occupancy models in spring 2012.

Small mammal trapping

We planned to conduct small mammal trapping in eight units, but were only able to trap at six units because of bear damage to traps, particularly on the eastern Sheep Mountain units. Overall, we successfully trapped mammals in all four north-facing (Henderson) units, but only on two south-facing (Sheep Mountain) units. Our analyses are therefore restricted to treatments versus controls, although we include simple comparisons of abundance on north versus south aspects.

Montane voles (*Microtus montanus*) were by far the most common small mammal in the units, accounting for 94% of all captures (Table 5). Density of montane voles estimated from Jolly-Seber models (Jolly 1965, Seber 1965) was slightly higher for control (125 voles/ha) versus treatment units (78 voles/ha). Voles also were also more common on the north-facing units. Generally, voles are associated with higher amounts of herbaceous vegetation and moisture (Sera and Early 2003), and consequently this finding is not necessarily surprising. Deer mice (*Peromyscus maniculatus*) and chipmunks (*Tamias* spp.) were only captured on the south facing units, although this does not necessarily reflect their true distribution since chipmunks were detected on north facing units during occupancy surveys (Table 4).

Table 5. Pre-treatment total number of mammals caught during 800 trap nights on units in Fisher Creek.

Site	Unit	Proposed Treatment	Montane vole	Dusky shrew[1]	Meadow vole	Deer mous e
Henderson (north aspect)						
	east a	treatment	11		1	
	west b	treatment	17			
	west a	control	11			
	east b	control	17	1		
Sheep Mountain (south aspect)						
	west b	control	8	2		
	west a	treatment	9			1
	total		**73**	**3**	**1**	**1**

[1] *Sorex monticolus*

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Summary of post treatment monitoring for the Cooke City Whitebark Pine restoration project

Prepared by Teresa Lorenz

December 31, 2014

Introduction

Whitebark pine (*Pinus albicaulis*) is a declining keystone species that occurs in high elevation and subalpine environments in western North America. It produces large seeds that are valued by wildlife for food. Few seeds escape being consumed or stored by at least one species, and the importance of vertebrate seed-eaters cannot be overestimated.

Whitebark pine relies on a songbird, Clark's nutcracker (*Nucifraga columbiana*), for seed dissemination and population-wide regeneration. In July 2011, whitebark pine was listed as a candidate species under the Endangered Species Act (ESA) because of repaid declines attributed to an exotic disease, white pine blister rust (caused by the fungus *Cronartium ribicola*), mountain pine beetle (*Dendroctonus ponderosae*) outbreaks, fire suppression, and climate change. To improve stand health and increase opportunities for regeneration, researchers advocate the use of mechanical thinning to cull competing vegetation. The immediate benefits of such restoration activities for individual whitebark pine trees are readily apparent, but the effects of such treatments on overall stand health and the seed- eating vertebrate community have not been previously studied using a before-after control- impact design. The objectives of this project were to monitor whitebark pine health and autumn cone production, as well as rodent and nutcracker abundance in response to such restoration treatments.

Study area

This project was conducted in the Fisher Creek drainage of the Gallatin National Forest, near Cooke City, Montana (approximately 45˚ 01' 11" N, 109˚ 65' 03" W).

Within Fisher Creek, we stratified our experimental design by aspect with one group of units (Henderson) facing generally north and the second (Sheep Mountain) facing south. We further divided Sheep Mountain into blocks by elevation because of considerable variation in elevation across the plot (Figure 1). Consequently, the Henderson site contains four study units and

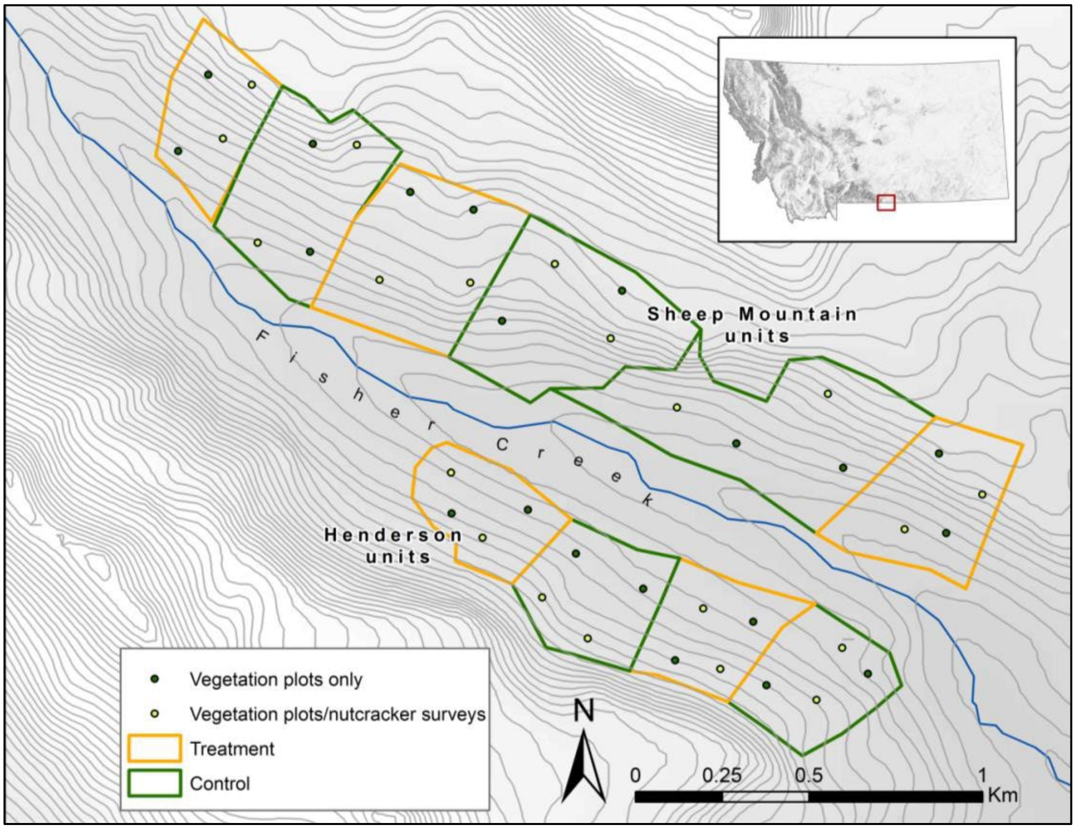

Figure 1. Map of project units and treatments for the whitebark pine restoration project at Cooke City, MT.

the Sheep Mountain site six units. For each adjoining pair of units, we randomly assigned a treatment (mechanical thinning; Table 1) or control (no thinning). Thus there were five units that were treated with mechanical thinning, and five units that were not thinned.
These ten study units represented our experimental units and were of approximately equal area (Table 1).

Table 1. Summary of aspect, treatment, and size for ten whitebark pine restoration units at Cooke City, MT.

Site	Unit	Aspect	Proposed treatment	Area in ha (acres)
Henderson	east a	north	thin fir and spruce	14.2 (35.1)
	east b	north	control – no thin	15.2 (37.6)
	west a	north	control – no thin	15.6 (38.6)
	west b	north	thin fir and spruce	13.9 (34.3)
Sheep Mountain	east a	south	control – no thin	14.9 (37.0)
	east b	south	thin fir and spruce	20.6 (51.1)
	mid a	south	thin fir and spruce	21.7 (53.8)
	mid b	south	control – no thin	20.6 (50.9)
	west a	south	thin fir and spruce	15.3 (37.9)
	west b	south	control – no thin	17.3 (42.9)

Methods

The thinning treatment consisted of cutting or girdling all Engelmann spruce (*Picea engelmannii*) and subalpine firs (*Abies lasiocarpa*) surrounding each sapling and adult whitebark pine. Sapling firs and spruces were piled for burning, although many piles were never burned or burned very poorly. All thinning, girdling, and burning activities were completed by autumn 2013. Vegetation and animal monitoring occurred both pre- and post- treatment. The pre-treatment monitoring occurred in September 2011, and post-treatment monitoring during the last week of August in 2014.

Pre-treatment monitoring included vegetation surveys and occupancy surveys for Clark's nutcrackers and pine squirrels (*Tamiasciurus hudsonicus*), as well as small mammal trapping. Post-treatment monitoring included only vegetation and occupancy surveys. We did not conduct small mammal trapping as part of post-treatment monitoring partly because of bear damage to traps in 2011.

Vegetation surveys were conducted at four random plots within each unit for a total of 40 vegetation plots surveyed in both years. We used point-center quarter methods (Cottam and Curtis 1956) to quantify changes to overstory tree composition and BBIRD protocol (Martin et al. 1997) to sample understory plant and ground cover. We conducted cone counts on all monitored whitebark pine trees in each unit and measured infection rates by white pine blister rust. In 2014, we also conducted counts of regenerating conifer saplings.

Within each unit, two of the vegetation survey plots were also locations for occupancy surveys for Clark's nutcrackers and pine squirrels, the two most influential seed eaters in whitebark pine communities. During these surveys, we counted and recorded the distance and direction to all audible and visible nutcrackers and squirrels.

In this report we summarize vegetation and occupancy survey results from 2014. We also make comparisons between vegetation cover and tree densities pre- and post-treatment on treated units, and compare cone and animal abundance between years. Importantly, the thinning treatments were conducted only one year prior to our 2014 surveys and so many of the expected treatment-induced vegetative changes had not yet occurred.

Results

Vegetation surveys

On treatment units ground cover by coarse woody debris (CWD) and litter increased numerically between 2011 and 2014 (Table 2), although overlapping confidence intervals indicate that this increase was non-significant for litter cover and marginally non- significant for CWD (Figure 2). Cover by shrubs decreased, although this decline was likewise marginally non-significant. The increase in CWD and litter is directly attributable to the placement of tree limbs and branches on the ground following the piling treatments, particularly the piling of small diameter, understory spruces and firs.

Table 2. Comparison in mean (standard deviation) cover by vegetation (forbs, grasses, and shrubs) and ground cover (coarse woody debris (CWD), litter, and soil) between pre-treatment (2011) and post-treatment (2014) years.

	Forb	Grass	Shrubs	CWD	Litter	Soil
Pre-treatment (2011)						
Control	23.0 (15.5)	4.9 (7.6)	38.4 (19.5)	16.4 (18.4)	57.6 (15.6)	3.5 (8.6)
Treatment	25.1 (20.1)	8.3 (12.5)	42.8 (19.8)	15.4 (22.7)	62.9 (25.8)	6.5 (13.8)
Post-treatment (2014)						
control	21.2 (11.1)	6.0 (2.8)	38.5 (15.4)	16.4 (18.4)	59.5 (15.4)	2.5 (6.7)
treatment	28.4 (12.6)	2.8 (2.1)	33.1 (12.3)	32.8 (27.6)	75.4 (17.2)	0.8 (0.9)

Photo showing CWD piles (foreground) and girdled Engelmann spruce (tree with red foliage in background) in the Henderson east unit. Most girdled trees were dying but still standing.

We observed that most large, canopy-level spruce and fir trees that had been girdled on treated plots were still partially alive; many of these girdled trees had yellow or red foliage and thus were clearly dying, but had not yet fallen to the ground. While we counted these trees as dead for the purpose of measuring tree densities within stands, most of them had not yet fallen or contributed to the CWD and litter in our measurements of ground cover. Over the next several years, we can therefore expect CWD and litter levels to increase dramatically as these girdled trees die and fall.

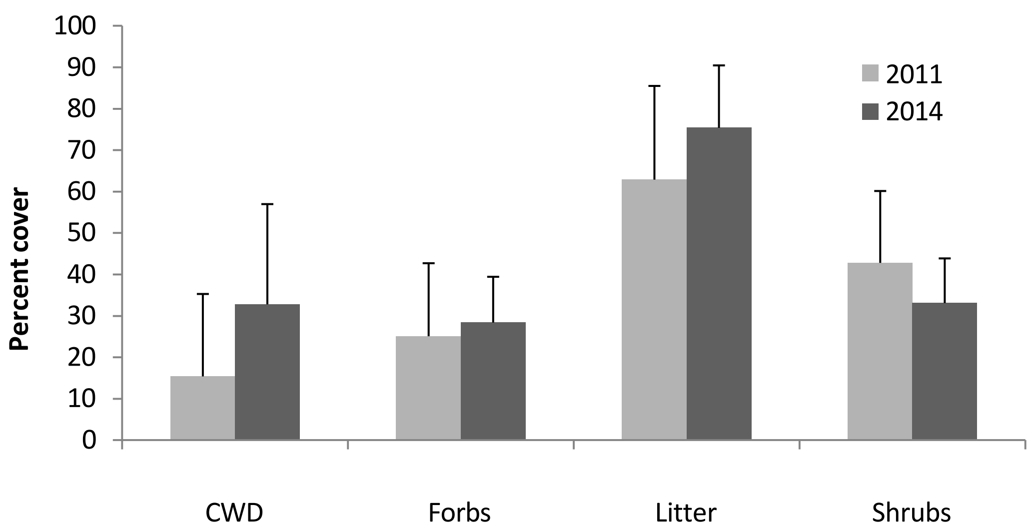

Figure 2. Changes in percent cover (mean and 95% CI) in coarse woody debris (CWD), forbs, littler, and shrubs between 2011 and 2014 on treatment plots

Photo of fallen and standing girdled spruce and fir trees in the treated Sheep Mountain mid unit. As in Henderson, many of the girdled trees were still standing.

Tree densities did not change on untreated units from 2011 to 2014 and therefore we focused on changes within the treated units. Overall densities of both spruce and fir declined following treatments, although changes on most plots were due to steeper declines in Engelmann spruce density, rather than subalpine fir density (Table 3). Total spruce-fir density decreased more on the Henderson units, likely due to an overall higher density of spruces and firs on the north-facing Henderson Mountain slopes. On average, Sheep Mountain subalpine fir density declined by 11 trees/ha while Engelmann spruce density declined by 27 tree/ha, compared to a 36 and 64 tree/ha decline on Henderson units (for subalpine fir and Engelmann spruce, respectively). Not surprisingly, overall whitebark pine tree density did not change appreciably between pre- and post treatment surveys, and the only documented change occurred on one Henderson east plot, where a single whitebark pine died from a mountain pine beetle infection.

Table 3. Changes in tree density (trees/ha) between pre- (2011) and post-treatment (2014) for treated units only. We did not observe changes in tree density on the untreated units.

		Pre-treatment		Post treatment	
Site	**Unit**	**Subalpine fir density**	**Engelmann spruce density**	**Subalpine fir density**	**Engelmann spruce density**
Henderson					
	east a	190.2	148.0	117.7	84.1
	west b	135.8	118.8	139.2	55.7
Sheep Mountain					
	east b	240.2	150.1	216.0	120.1
	mid a	80.6	30.2	73.2	6.6
	west a	113.9	27.8	113.9	<1.0

Table 4. Cone counts on whitebark pine trees pre- (2011) and post-treatment (2014).

Site	Unit	Treatment	2011 total cones	2014 total cones
Henderson	east a	treatment	36	8
	east b	control	156	14
	west a	control	6	0
	west b	treatment	24	0
Sheep Mountain	east a	control	232	84
	east b	treatment	165	61
	mid a	treatment	53	37
	mid b	control	438	200
	west a	treatment	125	7
	west b	control	127	24

Rates of blister rust infection were similar between pre-and post-treatment. In 2011 we documented an average of 3.0 infected whitebark pines per unit, compared to 3.2 in 2014, and the majority (92 percent) of the 2014 infections were from trees identified in 2011 as infected. None of the monitored whitebark pine trees had died from blister rust.

Cone density was lower in 2014 compared to 2011 (Table 4), almost certainly due to natural fluctuations in cone crop size rather than an effect of treatments. The average cones per unit in 2011 (136.2) was more than three times greater than the 2014 average of 43.5 cones per unit. Units that produced the majority of cones in 2011 also produced most cones in 2014; in both years, the Sheep Mountain east and mid units accounted for more than 65 percent of the total measured cone production.

In 2014 we measured regeneration rates of conifers on all plots. Subalpine fir was the most common species of regeneration in all units, accounting for 53 to 100 percent of all regenerating conifers (Table 5). Whitebark pine regeneration was absent on some plots, including the easternmost Sheep Mountain units and one of the Henderson west units.

Table 5. Seedling and sapling subalpine fir, Engelmann spruce and whitebark pines within units in 2014.

Site	Unit	Subalpine fir	Engelmann spruce	Whitebark pine
Henderson	east a	116	16	8
	east b	64	5	4
	west a	94	9	1
	west b	52	2	0
Sheep Mountain	east a	54	0	0
	east b	101	44	0
	mid a	58	2	5
	mid b	51	2	15
	west a	21	3	16
	west b	78	2	1

Occupancy surveys

We completed 600 minutes of surveys on 20 plots for Clark's nutcrackers and pine squirrels in both 2011 and 2014. In 2014 nutcrackers accounted for 50 percent of all detections (66 total detections) within the study unit boundaries, and on average this was 60 percent lower than within-unit nutcracker detections from 2011. This is likely because the whitebark pine cone crop was substantially lower in 2014 compared to 2011, and autumn nutcracker abundance is generally correlated with cone abundance (e.g., McKinney and Tomback 2007, Barringer et al. 2012). Because squirrels are less mobile than nutcrackers and rely on other conifer species for food, it is not surprising that squirrel numbers did not differ as much as nutcrackers between years. Total number of squirrel detections was 37 for 2011 and 48 for 2014. Similar to 2011, chipmunks were rarely detected in 2014, and we observed only a single chipmunk during our 2014 surveys.

Nutcracker ($t = 1.02$, $df = 8$, $P = 0.337$) and squirrel ($t = 1.31$, $df = 8$, $P = 0.228$) numbers did not differ between treatments and controls in 2014. Regardless of treatment, we observed a marginally non-significant correlation between whitebark pine cone counts and Clark's nutcracker detections ($r = 0.463$, $P = 0.089$). Squirrel detections were not associated with whitebark pine cone counts ($r = 0.186$, $P = 0.303$)

Table 6. Mean number of pine squirrels, Clark's nutcrackers, and chipmunks detected during 10- minute point counts pre- and post treatment.

			Pine squirrel		Clark's nutcracker		Chipmunk	
Site	**Unit**	**Treatment**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
Henderson								
	east a	treatment	0.7	1.0	1.5	1.5	0.0	0.0
	east b	control	1.2	0.8	2.5	1.8	0.0	0.0
	west a	control	0.5	0.3	1.2	0.7	0.2	0.0
	west b	treatment	0.8	0.8	1.7	0.7	0.0	0.0
Sheep Mountain								
	east a	control	1.5	1.0	3.3	0.7	0.3	0.0
	east b	treatment	0.5	0.7	0.5	0.0	0.0	0.0
	mid a	treatment	0.0	1.3	1.3	2.0	0.0	0.0
	mid b	control	0.7	0.8	2.8	2.5	0.0	0.0
	west a	treatment	0.0	0.7	1.7	0.0	0.0	0.2
	west b	control	0.3	0.5	0.8	1.2	0.2	0.0

Conclusion

We observed few changes in vegetation and animal abundance following thinning treatments, presumably because spruce and fir trees that had been girdled were still partially alive and had not yet fallen. We expect that most of the effects of thinning will not be observed for several years to come, and we encourage future monitoring of these units to document changes to tree density, ground cover, and whitebark pine cone production as the girdled spruce and fir trees die and fall. In particular, as CWD cover increases in stands, it is possible that numbers of granivorous rodents will also increase, and therefore future monitoring of rodent populations will be important.

Despite the limitations of our 2014 monitoring effort, we observed an slight increase in CWD cover in 2014 on the treated units, attributable to the thinning and piling of small- diameter sapling spruces and firs. Densities of live, canopy-level spruces and firs also declined, while whitebark pine density did not change. We did not observe differences in whitebark pine blister rust infection rates, and mountain pine beetle mortality was rare. However, cone abundance was lower in 2014 compared to 2011, and this corresponded with lower numbers of nutcrackers on most units during post-treatment monitoring. Given that whitebark pine cone crops fluctuate widely in natural systems, long-term monitoring will be needed to ascertain whether treatments affect overall cone production and nutcracker visitation rates.

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Attachment 9. Excel spreadsheet summarizing comments to the proposed Cooke City Fuels and Forest Health Project.

Scoping

Last name	First Name	For/Against
Logan	Jesse	Opposed
Hjortsberg	Max	Opposed
Iverson	Kathryn	Opposed
Garrity	Michael	Opposed
Prinkki	John	Support with changes
Visty	Judith	Opposed
Visty	Peter Allen	Opposed
Mahnke	Mary	Opposed
Nelson	Tom	Opposed
Ferguson	Laura	Opposed
Ferguson	Sarah	Opposed
Wessells	Colin	Opposed
Barrett	Heidi	Opposed
Meghan	Meghan	
House	James	Opposed
Kellogg	Joseph and Donna	Ambigious
Barrett	Heidi	Opposed
Kellogg	Robert	Opposed
Wolfe	Anna	Opposed
Sloan	Martha	Opposed
Eiermann	David	
Healow	Linda	Opposed
Eldred	Colleen	Opposed
Flury	Rachel	Opposed
Tabor	Victor	Opposed
Harbor	Jonathan	Support
MacAlpine	Renata	Opposed
Tucker	Chris	Opposed
Nelson	Tom	Opposed
Hansen KingmanChristine	Christine	Opposed
DuCharme	Ron	Support
Hartsoe	Jack	Support
Powers	Diane	Support
Johnson	Sara	Opposed
Partin	Tom	Support
Grover	William	Opposed

Belice	Lara	Opposed
Logan	Catherine	Opposed

Draft EA

Last name	First Name	For/Against
Logan	Jesse	Opposed
Hjortsberg	Max	Opposed
Iverson	Kathryn	Opposed
Garrity	Michael	Opposed
Prinkki	John	Support with changes
Visty	Judith	Opposed
Visty	Peter Allen	Opposed
Mahnke	Mary	Opposed
Nelson	Tom	Opposed
Ferguson	Laura	Opposed
Ferguson	Sarah	Opposed
Wessells	Colin	Opposed
Barrett	Heidi	Opposed
Meghan	Meghan	
House	James	Opposed
Kellogg	Joseph and Donna	Ambigious
Barrett	Heidi	Opposed
Kellogg	Robert	Opposed
Wolfe	Anna	Opposed
Sloan	Martha	Opposed
Eiermann	David	
Healow	Linda	Opposed
Eldred	Colleen	Opposed
Flury	Rachel	Opposed
Tabor	Victor	Opposed
Harbor	Jonathan	Support
MacAlpine	Renata	Opposed
Tucker	Chris	Opposed
Nelson	Tom	Opposed
Hansen KingmanChristine	Christine	Opposed
DuCharme	Ron	Support
Hartsoe	Jack	Support
Powers	Diane	Support
Johnson	Sara	Opposed
Partin	Tom	Support
Grover	William	Opposed

Belice	Lara	Opposed
Logan	Catherine	Opposed