



WILDERNESS WATCH

Keeping Wilderness Wild

Board of Directors

Louise Lasley, NM
President

Marty Almquist, MT
Vice President

Gary Macfarlane, ID
Secretary

René Voss, CA
Treasurer

Talasi Brooks, ID

Franz Camenzind, WY

Mark Peterson, WI

Cyndi Tuell, AZ

Howie Wolke, MT

Executive Director
George Nickas

Advisory Council
Magalen Bryant
Dr. Derek Craighead
Dr. M. Rupert Cutler
Dr. Roderick Nash

Minnesota Office
2833 43rd Ave. South
Minneapolis, MN
55406

Idaho Office
P.O. Box 9765
Moscow, ID 83843

April 21, 2021

Buffalo Creek Yellowstone Cutthroat Trout Conservation
Gardiner Ranger District

P.O. Box 5
Gardiner, MT 59030

<https://cara.ecosystem-management.org/Public/CommentInput?Project=59630>

Montana Fish, Wildlife & Parks

2300 Elmo Lake Drive

Billings, MT 59105

fwpreion5pc@mt.gov

Dear U.S. Forest Service and Montana Fish, Wildlife & Parks Staff,

The following are comments from Wilderness Watch on the misleadingly titled Buffalo Creek Yellowstone Cutthroat Trout Conservation Project, which would authorize intensive ecological manipulation in the Absaroka-Beartooth Wilderness. The proposed project includes poisoning 43-47 miles of streams and two lakes above a natural fish migration barrier (the Buffalo Creek falls) in the Absaroka-Beartooth Wilderness, breaching beaver dams throughout the project area, and a multi-year fish stocking effort using hatchery-reared Yellowstone cutthroat trout in areas that were historically fishless. In addition to this significant trammeling of the Absaroka-Beartooth Wilderness, the project also proposes an unprecedented amount of motor vehicle and motorized equipment use, including helicopter flights, motorboats, pumps, and gas-powered generators.

Wilderness Watch is a national wilderness conservation organization with headquarters in Missoula, Montana. Our mission is to protect the wilderness character of all units of the National Wilderness Preservation System, including the Absaroka-Beartooth Wilderness. While Wilderness Watch appreciates the concern for long-term viability of Yellowstone cutthroat trout, we believe the project as proposed is contrary to the letter and spirit of the Wilderness Act. We believe efforts to restore Yellowstone cutthroat (YCT) should focus on those areas where they were naturally found, and not in naturally fishless waters where the introduction of fish will compromise the native biota.

Preliminary Concerns: Lack of Adequate Public Involvement and NEPA Review

We are dismayed that your agencies are contemplating categorically excluding from National Environmental Policy Act (NEPA) review a project of this size, scope, and controversial effect in designated Wilderness, particularly where the proposal includes the use of piscicides to kill fish, fish “stocking” in areas that were historically fishless, and the use of motorboats, generators, helicopters, structures, and installations to accomplish it all. All of these things are either explicitly prohibited under Section 4(c) of the Wilderness Act or in serious conflict with the Act’s “untrammeled” mandate. An MRDG has yet to be completed for this project. Yet, incredibly, the Forest Service is considering not even conducting its own environmental review and is considering possibly authorizing this project through a categorical exclusion! This is the second such project proposed by Montana Fish, Wildlife and Parks this year and the second such project considered for categorical exclusion by the Forest Service. The cumulative and precedential effects of the agencies’ actions are highly concerning.

Wilderness Watch requests that the Custer-Gallatin Forest Supervisor commit to completing an EA or EIS, particularly where it appears the Forest Service is considering multiple similar actions that have the potential to significantly impact ecosystems in the region. The proposed use of a categorical exclusion violates both NEPA and the Wilderness Act. In fact, the administration has issued an order (attached) requiring review of actions that are done pursuant to section 4(c) of the Wilderness Act. The extensive helicopter and other motorized equipment and transport proposed in this project are activities that are presumptively prohibited in Wilderness under Section 4(c). Furthermore, a directive from the Forest Service Regional Office regarding Wilderness and CEs (April 28, 1997) notes that, “We should start our project analysis thinking at the EA level and go from there . . . In my view, using a CE for projects in Wilderness will be the exception rather than the rule.” If a CE can be used in Wilderness to exempt projects of this size and scope, utilizing a wide array of generally prohibited uses and significantly altering ecological processes, then one has to wonder if any project ever would rise to the level of an EA or EIS.

The State’s draft EA does not remedy this problem. The State of Montana has no legal authorization to manage and administer federal Wilderness. It’s not surprising the State’s analysis lacks wilderness considerations as the State has neither the responsibility for wilderness stewardship nor the expertise to do such an analysis. We had expected the Forest Service would prepare a professional analysis and engage the public in the NEPA process. Apparently, the Forest Service is leaving open the possibility that it will take a pass. The State’s draft EA does not constitute a NEPA document. It is likely that projects like this are what led the acting Undersecretary of Agriculture to issue his February 1, 2021 memorandum requiring the FS to submit for NRE’s review all projects for “[A]ctivities in designated wilderness areas taken pursuant to Sections 4(c) and 4(d) of the Wilderness Act,” such as this project. This should be a wake-up call for you to engage the public in a meaningful public comment period and prepare the proper level of NEPA analysis, which in this case is an environmental impact statement (EIS), not a mere categorical exclusion (CE).

Since the Forest Service did not prepare the State’s draft EA, there is no adequate analysis of impacts to Wilderness or wilderness character in the EA. In fact, the State’s draft EA admits as much stating, “The U.S. Forest Service may use the analysis presented in this EA, in addition to

the MRDG, to inform its decision whether to allow the proposed piscicide application and operation of motorized equipment in the Absaroka Beartooth Wilderness.” State’s draft EA at 20. Again, the State’s EA has no legitimate NEPA analysis of impacts to Wilderness.

The Forest Service has the duty to protect the Absaroka-Beartooth Wilderness. “Congress made preservation of wilderness values ‘the primary duty of the Forest Service, and it must guide all decisions as the first and foremost standard of review for any proposed action.’” *Wilderness Watch v. Vilsack*, 229 F.Supp.3d 1170, 1182 (D. Id. 2017) (citing *Greater Yellowstone Coalition v. Timchak*, 2006 WL 3386731 at *6 (D. Id. Nov. 21, 2006)). While FWP has the responsibility to manage wildlife across Montana, wilderness designation places restrictions on that management authority and requires the Forest Service to ensure that any state wildlife management activities in Wilderness, including research, are conducted in a manner that preserves wilderness character. Congress provided a clear mandate for administering agencies: “[E]ach agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character.” 16 U.S.C. § 1133(b). The Forest Service is abdicating its statutory duties by deferring to the State’s objectives and avoiding meaningful public scrutiny and engagement.

Wilderness Act Concerns

The Forest Service may only approve a motor-assisted poisoning and stocking project in the Wilderness if the Forest Service rationally demonstrates that the project is consistent with the purpose of the Wilderness Act, that the action is necessary to meet minimum requirements for administration of the area as Wilderness, and that there is no alternative to otherwise-prohibited methods that would achieve that purpose. *See* 16 U.S.C. § 1133(c). The justifications for the project advanced in the draft EA fall far short of these stringent standards.

FWP’s proposal for intensive, wide-scale ecological manipulation is fundamentally at odds with wilderness preservation.

The project would authorize the chemical eradication of trout in 43-47 miles of stream and 2 lakes above a natural fish migration barrier (the Buffalo Creek falls) near the boundary of Yellowstone National Park and the Absaroka-Beartooth Wilderness, breaching of beaver dams throughout the project area, and a “restocking” of hatchery-reared Yellowstone cutthroat trout in areas that were historically (and in some cases currently) fishless. (The draft EA refers to 43 miles of streams in one place, 46 in another, and 47 in yet another.) This is an example of a highly controversial and hotly disputed trend emerging in Wilderness management—one where Wilderness-administering agencies are giving up on the idea of Wilderness and opting more readily for human intervention and manipulation to achieve or maintain some other desired condition.

The Wilderness Act establishes a National Wilderness Preservation System to safeguard our wildest landscapes in their “natural,” “untrammelled” condition. 16 U.S.C. § 1131(a). Wilderness is statutorily defined as “an area where the earth and its community of life are untrammelled by

man” and an area “retaining its primeval character and influence... which is protected and managed so as to preserve its natural conditions....” *Id.* § 1131(c). In contrast to other areas where multiple use mandates and human-preferred values for “desired conditions” drive management decisions, in Wilderness, the Wilderness Act sets forth the desired condition. In Wilderness, the desired condition is a wild, primitive landscape, untrammled by man, where natural processes prevail. Accordingly,

In contrast to other public land management statutes, which typically authorize agencies to consider and weigh diverse values through exercise of their scientific and policy expertise, the Wilderness Act required certain areas to be managed predominantly for one use: wilderness preservation....

Unlike all other land-management statutes, the Wilderness Act’s basic purpose was not to delegate authority to expert agencies, but rather, to exclude certain lands from the application of the agencies’ specialized expertise, to restrain agency flexibility, and to protect (with limited, narrow exceptions) certain lands from the impact of the sort of policy choices land managers typically make.

Sean Kammer, *Coming to Terms with Wilderness: The Wilderness Act and the Problem of Wildlife Restoration*, 43 ENVTL. L. 83, 100-101 (2013).

Consistent with the Wilderness Act and its implementing regulations, the Forest Service’s management direction states, “Wildlife and fish management programs shall be consistent with wilderness values,” FSM 2323.32(3), and the Forest Service is directed to “[d]iscourage measures for direct control (other than normal harvest) of wildlife and fish populations,” FSM 2323.32(4), and “[p]rovide an environment where the forces of natural selection and survival rather than human actions determine which and what numbers of wildlife species will exist,” FSM 2323.31(1). Further, the Forest Service is directed to “[m]aintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.” FSM 2320.2.

FWP’s goals and methods in its project proposal are simply at odds with the administration of “area[s] where the earth and its community of life are untrammled by man,” 16 U.S.C. § 1131(c).

Aside from using prohibited means, this action would extensively trammel Wilderness. Howard Zahniser, drafter of the Wilderness Act, stated that “[a] wilderness is an area where the earth and its community of life are untrammled by man. (Untrammled – not untrampled – untrammled, meaning free, unbound, unhampered, unchecked, having the freedom of the wilderness.)” While the Montana FWP is claiming this is necessary, “[t]hese threats do not justify further interventions into the natural processes within wilderness areas. These projects, whose purposes are to restore (or redirect) natural processes through the exercise of human agency, are precisely the intrusions of human culture that the Wilderness Act meant to exclude from these special places.”¹ This mandate is reflected in the epigram written by Howard Zahniser, “*With regard to*

¹ See attached, Sean Kammer, *Coming to Terms with Wilderness: The Wilderness Act and the Problem of Wildlife Restoration*, 43 Environmental Law 83, 86 (2013).

areas of wilderness, we should be guardians not gardeners.”

This fundamental tenet of wilderness stewardship was reiterated in a program review initiated by the four federal agencies and conducted by the Pinchot Institute for Conservation in 2001. The purpose of the study was to examine the critical management issues facing Wilderness. One of the eight “fundamental principles” for stewardship emphasized the need to preserve the wildness in Wilderness. As the Pinchot report stated, “Protection of the natural wild, where nature is not controlled, is critical in ensuring that a place is wilderness...Since wild is a fundamental characteristic of wilderness that is not attainable elsewhere, if there is a choice between emphasizing naturalness and wildness, stewards should err on the side of wildness.”²

In *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System*, Landres et al. 2015. RMRS-GTR-340³ has this to say about untrammeled:

To preserve the Untrammeled Quality of wilderness, managers need to exercise restraint when authorizing actions that manipulate any aspect of the wilderness—in general actions that trammel should be avoided as an essential principle of wilderness stewardship unless it can be shown that these actions are necessary to preserve wilderness character as a whole (Kaye 2014).

Landres et al. 2015 at 34. It is hard to conceive of trammeling actions that would be necessary for this purpose. The Strategy cited above and its associated *Monitoring Selected Conditions Related to Wilderness Character: A National Framework*. Landres, et al. 2005. RMRS-GTR-151 cites two of the Forest Service’s preeminent wilderness researchers in describing how the untrammeled quality of Wilderness affects management. Cole (2000) in Framework states that untrammeled “suggests more about the *process* of management than it does about the *outcomes* of management.” (Emphasis added). The Strategy paper states,

Lucas (1973, p. 151) stated, “If ecological processes operate essentially uncontrolled within the Wilderness frame of reference, the results, whatever they might be, are desirable by definition. The object is not to stop change, nor to recreate conditions as of some arbitrary historical date, nor to strive for favorable change in big game populations or in scenic vistas. The object is to let nature ‘roll the dice’ and accept the results with interest and scientific curiosity.”

Landres et al. 2015 at 33.

We appreciate concern for the long-term viability of Yellowstone cutthroat trout, and we appreciate that it and many other species have been and will be greatly impacted by human influence, including climate change. But intensive intervention and manipulation projects such as the one here raise concerning questions over the long-term viability of Wilderness as well.

² See attached Brown et al. Report from the Pinchot Institute.

³ While we have serious concerns with this protocol, see attached critique (Cole et al. 2015), it does recognize that trammeling negatively affects Wilderness. Our comments expand upon this concern.

Ultimately, “whatever ‘wilderness character’ means, it cannot be something that depends upon the active manipulations of humans.” Sean Kammer, *Coming to Terms with Wilderness: The Wilderness Act and the Problem of Wildlife Restoration*, 43 ENVTL. L. 83, 86 (2013). Restraint and humility are important values underpinning the Wilderness Act, and “[I]and managers should exercise this same humility in dealing with wilderness areas, lest they lead us down a path to where there are no longer any places that are truly ‘wild,’ no places beyond the control of human institutions and cultural imperatives.” *Id.* The Forest Service should not authorize the project because it is incompatible with the purpose of the Wilderness Act. At the very least, the Forest Service must seriously consider, in a public NEPA document, alternatives that lessen or avoid this conflict, including alternatives that do not include motorized use and fish stocking.

The Forest Service has not addressed the risk of project activities actually exacerbating problems stemming from prior ecosystem manipulation or reconciled that risk with the stringent goals of the Wilderness Act.

Aside from a one-sentence acknowledgement that the “Some aquatic invertebrates and gilled amphibians⁴ are sensitive to rotenone; however, timing of application and using the lowest effective concentration would minimize the toxicity of rotenone to these nontarget organisms (Finlayson et al. 2010; Vinson et al. 2010; Skorupski 2011) (draft EA, pp. 21-22)”, there is no discussion about direct and indirect effects of poisoning waterways and introducing YCT into areas it has not historically and/or does not currently exist.

Leaving Wilderness to serve as a baseline for comparison against agency tinkering elsewhere has value because we so often get things wrong. For example, in 2012, federal and state wildlife officials learned that a fish “believed to be the greenback cutthroat trout, which for more than forty years had been the focus of state and federal recovery efforts in Colorado streams and lakes, was, in essence, the wrong fish. Populations of greenback cutthroat trout that had been carefully reared, protected, and restored to Front Range habitats were more likely variants of a different subspecies, the Colorado River cutthroat trout[.]” Havlick and Biermann 2020. DNA advancements made this realization possible. But this is the way of scientific inquiry – today’s understandings bring forth tomorrow’s questions. And, as one scientist put it, “We can only ask questions that we have imagination for.”⁵

When applying a chemical poisoning agent to water bodies, there are likely many consequences—both known and unknown.

Rotenone is a poison that kills all organisms that utilize gills during part of their life cycle.

⁴ The EA states on page 51, “Stocking rainbow trout in fishless lakes has been detrimental to amphibians (Knapp and Matthews 2000), especially in the Sierra Nevada where frogs did not coevolve with nonnative fish.” However, there are native fish in the Sierra, just not in the high elevation lakes and upper elevations, which were historically fishless, just like in the Absaroka-Beartooth Wilderness. As such, this part of the EA is very misleading.

⁵ <https://www.theatlantic.com/science/archive/2019/01/how-lichens-explain-and-re-explain-world/580681/> Yong, E. 2019. *The Overlooked Organisms that Keep Challenging Our Assumptions About Life*. The Atlantic.

These organisms include not only the targeted non-native fish, but amphibians, macroinvertebrates, and other non-target organisms that use gills. See Erman 2012, Dalu et al. 2015, and Mangum and Madrigal 1999.

In particular, it is important to note the EA cites to Finlayson et al. 2010 in looking at impacts from rotenone. Erman 2012 states, “The study by Finlayson et al. (2010) had serious methodological problems in toxicity testing and analysis that render their conclusions suspect or incorrect.” The Montana Chapter of the Wildlife Society cites other studies relating to rotenone dealing with an amphibian known to inhabit the area, the Rocky Mountain tailed frog. In Montana all amphibian larvae as well as tailed frog (*Ascaphus truei*) adults ... either use some sort of aquatic respiration or may be unlikely to exit treated water bodies depending on the time of day and presence/absence of humans (Daugherty and Sheldon 1982 and Ernst et al. 1994). Thus, all of these species are likely to suffer mortality through the application of piscicides.” Joslin, G., and H. Youmans, coordinators 1999 at 2.7.

The research we have cited on the negative impacts of rotenone are applicable here.⁶ At the very least, there is scientific controversy over the effects of rotenone on macroinvertebrates and amphibians. This scientific controversy needs to be honestly and directly addressed. The draft EA downplays impacts because it is written from a fisheries-centric perspective. Regardless, chemicals like rotenone and potassium permanganate would bring a significant trammeling to the wilderness character of two lakes and up to 47 miles of streams in violation of the basic tenants of the 1964 Wilderness Act (16 U.S.C. 1131-1136).

The concerns over poisoning such a vast area warrant scrutiny and pause. Other research about use of rotenone include Billman 2010, Billman et al. 2011, Billman et al. 2012. Research has demonstrated the unintended consequences of rotenone use. So has experience. There were impacts to tailed frogs in the Bitterroot Mountains (see Sampling for Rocky Mountain Tailed Frog (*Ascaphus montanus*) on Overwhich Creek August 2019). Other media reports and communications have recognized the problems of rotenone as well (see Other articles file in attached in the News Articles folder).

In 2010, in a westslope cutthroat trout project, a FWP rotenone poisoning operation went awry poisoning fish in a four-mile down-river stretch of Cherry Creek, a tributary to the Madison River.⁷ FWP never figured out how it happened, but nonetheless, it’s surprisingly certain it will never happen again. This supposedly “controlled” FWP poisoning project was on a much smaller scale that what is planned for the Absaroka-Beartooth Wilderness. The FWP suspicion that rotenone got into the ground water, and later resurfaced downstream should give the Forest Service pause about the use of rotenone in the Absaroka-Beartooth Wilderness.

⁶ Further, one of the advocates of rotenone use cited in the EA, either a current or former employee of FWP, is the lead author of a study that states, “Macroinvertebrates sampled within the detoxification area experienced similar, but greater, effects from the potassium permanganate than individuals within the treatment area that were exposed to rotenone.” Skaar et al 2017. The EA is largely devoid of analysis of the negative impacts of potassium permanganate.

⁷ See the attached article in the Bozeman Daily Chronicle, August 14, 2010, by Daniel Person.

Site-specific analysis of its use in the Absaroka-Beartooth Wilderness is also needed. That requires the preparation of an EIS.

As we stated in our comments to the State on the North Fork Blackfoot poisoning project, “The literature cited in the EA and the EA itself note that the habitat complexity make it impossible to have a complete kill of fish. If the desired percentages of genetic purity are not met, then what?” In this EA, page 23 states this complexity, the result of beaver dams⁸, would require motorized pumps and maybe even aircraft dispersal of rotenone! EA at 23. Habitat complexity is also blamed for the rejection of electrofishing. EA at 26. Yet, page 42 states, “The goal is total eradication of rainbow trout, so streams and Hidden Lake would not have a food base for fish-eating birds until the population recovers, which typically takes 5 years.” Why is complete eradication possible here but not in the Scapegoat, which also has complex habitat? This inconsistency is glaring.

The questions raised by actions like the ones proposed here are complicated outside of Wilderness and scientists are calling for broader discussion over the implications:

While trout management has typically relied on human intervention, the turn to genetic science is bringing new lineages and taxa into being, altering long-standing conservation priorities and intensifying the manipulation of biological processes such as reproduction and dispersal. As a result, other social and ecological factors are pushed to the margins of management decisions. These changes, we argue, warrant greater conversation about the consequences of molecular analyses and the values embedded in trout science and conservation more broadly.

Cutthroat trout are just one of many organisms today for whom managers are making life and death decisions based on subtle differences in genetic makeup or genealogy.

...

In Colorado, recent findings about native cutthroat trout lineages and genetics have brought to the fore practical and philosophical questions about how DNA analyses will guide management. Categorizations of wildness, nativeness, and purity are complicated not only by changing assumptions about trout taxonomy and genetics, but also by the history of anthropogenic fish transfers and recent decades of attachment by anglers to particular fisheries.

Havlick and Biermann 2020 at 3 and 6. Inside Wilderness, these actions are incredibly controversial and for good reason. The Wilderness Act has already resolved the conflict in favor of wildness and in favor of removing intentional human interference—and its associated value bias and unintended consequences—from the equation. The Forest Service has failed to reconcile, or even address, this tension. The Forest Service cannot demonstrate the project’s compatibility with the goals and proscriptions of the Wilderness Act without doing so.

⁸ It is unclear why helicopters are needed to notch beaver dams when other proposals, like that in the Scapegoat Wilderness, are proposed to be done by hand. *See* EA at 57 and 58. Setting aside the issue of trammeling, if the agencies can manipulate beaver dams without motorized means, then motorized means cannot be authorized.

FWP's proposal is not necessary to meet minimum requirements for administration of the Absaroka-Beartooth Wilderness.

Even if FWP's proposal could be construed as wilderness-compatible, which it cannot, the proposal still runs afoul of the Wilderness Act because it is not *necessary* to meet *minimum requirements* for administration of the Wilderness.

a. The Wilderness Act requires that projects using prohibited uses must not exceed the minimum requirements necessary for the administration of the area as Wilderness.

The Wilderness Act generally prohibits temporary roads, motorized vehicles, motorized equipment, or boats, aircraft, mechanical transport, or human installations in designated Wilderness. The Act does contain a very narrow exception to these prohibited uses where “necessary to meet minimum requirements for the administration of the area for the purpose of [the preservation of wilderness character].” (16 U.S.C. 1133[c])

This section of the Wilderness Act is sometimes referred to as the “minimum requirements” exception. The words “necessary” and “minimum requirements” together require both that the goals of the activity be integral to the wilderness character of the area, and that the activity be the “minimum tool” (least disruptive of the wilderness) for achieving those goals. Wilderness areas must be managed so as to minimize manipulations of their natural processes (to keep them wild) and to prohibit certain human activities that harm that wildness -- namely motorized vehicles and equipment, aircraft, motorized boats, etc. Kammer at 123-124. The Buffalo Creek poisoning project does not meet the narrow “minimum requirements” exception because the goal is not a wilderness purpose, nor are the methods proposed for conducting the project the “minimum necessary”.

The presence of fish in a previously fishless area is a significant impact and this proposal would perpetuate that problem. (See also Pilliod and Peterson 2001; Schindler et al. 2000; and Knapp et al. 2000). The draft EA does not articulate a defensible wilderness-based need for fish poisoning followed by fish stocking and does not indicate how artificial fish stocking is necessary to administer the Absaroka-Beartooth Wilderness “so as to preserve its natural conditions” and maintain the wilderness as “an area where the earth and its community of life are untrammelled by man.” 16 U.S.C. § 1131(c). Indeed, it would be incredibly difficult to articulate a need for artificial fish stocking in wilderness streams that were historically fishless. *See* “Non-Native Trout in Natural Lakes of the Sierra Nevada: An Analysis of Their Distribution and Impacts on Native Aquatic Biota” (noting that “trout stocking serves to maintain an artificial fishery that has substantial impacts on native aquatic biota” and that stocking is necessarily at odds with wilderness, “areas managed for their natural values”); *see also* “Non-Native Fish Introductions and the Reversibility of Amphibian Declines in the Sierra Nevada” (Forest Service publication noting that the introduction of non-native trout into naturally fishless lake ecosystems is a major cause of decline in certain amphibians). Both studies, by Knapp, are attached as are Dunham et al. 2004, Knapp et al 2001, Schindler et al. 2001, Pister 2001, Pilliod and Peterson 2001, and Matthews and Knapp 1999, which also address the issue. It should also be noted, the goal of this project is not to return this area to a fishless state, which was the historic condition prior to stocking.

In sum, the preponderance of evidence suggests there were no Yellowstone cutthroat trout historically above the falls in what is now the Absaroka-Beartooth Wilderness. Active stocking, perpetuation, and manipulation of fish populations in historically fishless streams is directly at odds with the Forest Service's management guidance. *See* FSM 2323.31 ("Provide an environment where the forces of natural selection and survival rather than human actions determine which and what numbers of wildlife species will exist."); *see also* FSM 2320.2 ("Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces."). Given the clear inconsistency with Wilderness Act mandates and the Forest Service's management guidance, the artificial fish-stocking component of the proposed action cannot be authorized. It is not the minimum necessary for preservation of the area as Wilderness as required by the Wilderness Act.⁹

b. A non-motorized alternative was not considered, and the motorized uses considered are not the minimum necessary.

The draft EA fails to consider a non-motorized transport alternative even though it would be possible. The State's draft EA proposes significant helicopter and other motorized equipment and transport use. However, the amount of helicopter use is not clear.

Helicopter and motorized equipment use in the Wilderness is prohibited under the Wilderness Act "except as necessary to meet minimum requirements for the administration of the area" as wilderness. 16 U.S.C. § 1133(c); *see also* 36 C.F.R. § 261.18(c) (Forest Service regulations prohibiting "[l]anding of aircraft, or dropping or picking up of any material, supplies, or person by means of aircraft, including a helicopter" in National Forest Wilderness); 36 C.F.R. § 293.6 (prohibiting "mechanical transport," "landing of aircraft," and "dropping of materials, supplies, or persons from aircraft" in wilderness except as provided by Wilderness Act). Consistent with the Wilderness Act and its implementing regulations, the Forest Service's management direction makes clear "Wildlife and fish management programs shall be consistent with wilderness values," FSM 2323.32(3), and the Forest Service is directed to "[d]iscourage measures for direct control (other than normal harvest) of wildlife and fish populations," FSM 2323.32(4), and "[p]rovide an environment where the forces of natural selection and survival rather than human actions determine which and what numbers of wildlife species will exist," FSM 2323.31(1). If the Forest Service could approve helicopter-assisted management any time the state agency requests it, the statutory prohibition against helicopter use would be meaningless.

Accordingly, under the Wilderness Act, the Forest Service may only approve the use of helicopters and motorized equipment and poisoning of fish in the Absaroka-Beartooth Wilderness if the Forest Service rationally demonstrates that it is necessary to meet minimum requirements for administration of the area (singular) for the purpose of the Wilderness Act, and

⁹ *See also* State's EA at iv which states, "Stocking catchable Yellowstone cutthroat trout into Hidden Lake would mitigate for the short-term loss of angling opportunities." This is hardly wilderness dependent.

there is no alternative to otherwise-prohibited uses that would achieve that purpose. *See* 16 U.S.C. § 1133(c). But there is no wilderness purpose for this proposed action, as we discuss in this comment.

The Wilderness Act contains a “narrow” exception authorizing helicopter use only where necessary to “further the wilderness character of the area.” *Wolf Recovery Found.*, 692 F. Supp. 2d 1264, 1267-68 (D. Id. 2010) (quotation omitted). This exception permits otherwise-prohibited activities only in the “most rare of circumstances.” *Id.* at 1268. Similarly, this circumstance, particularly in combination with other factors, raises substantial questions over the significance of the proposed action’s direct, indirect, and cumulative impacts to wilderness. *See Wilderness Watch v. Vilsack*, No. 4:16-cv-12-BLW, at 17 (D. Id. Jan. 18, 2017) (finding 40 C.F.R. § 1508.27(b)(3) “is triggered because the project took place in the Wilderness Area.”).

What is clear is that the materials can be hauled in by packstring, as demonstrated by such an option being considered for a larger project in the Scapegoat Wilderness.¹⁰ While it would take more time, it would be the minimum necessary **IF** the rest of the proposal were consistent with the Wilderness.

The State’s draft EA does not justify the use of other motorized transport either. Both lakes are small and it seems to stretch credulity that algae would prohibit the use of an oar powered raft. (see Knapp and Matthews 1998). Such an option should have been considered **IF** the rest of the proposal were to meet the minimum necessary to be consistent with the Wilderness.

The analysis needs to consider, and the decision needs to justify, each authorization for motorized use. For example, if the surface area and volume of Hidden Lake precludes using nets or other nonmotorized means to remove fish, that doesn’t mean those methods won’t work on the much smaller nearby lake. No option was considered that would treat either lake with gill nets and all options in the draft EA considered using motorized pumps for rotenone dispersal. (See also Knapp and Matthews 1998).

Similarly, the assessment concludes using pack animals to haul rotenone to the site would not be safe, even though there is no rationale or documentation to back up that assertion. The draft EA does not consider the level of impact and number of animals in the context of the number of pack animals that traverse the area in an average year, nor the impacts compared to the number of pack animals that would be expected to travel the area in the next five or ten years. There’s no evidence presented to indicate that the impacts from using pack animals to haul rotenone and other supplies would have a significant or even noticeable additional impact on the Wilderness, nor why such pack stock use would be unsafe.

¹⁰ The EA alleges on pages 25, “A helicopter is necessary to transport large metal cages, typically used for backcountry fire camps, to secure rotenone, garbage, and other attractants from grizzly bears.” If that were the case, why in the Scapegoat project, also grizzly habitat, are these precautions not proposed. In any case, food and garbage can be suspended or in containers unavailable to bears. This EA makes it appear the FWP is unable to camp properly in grizzly country.

The proposal in the draft EA also justifies using helicopters to haul supplies to locations not easily reached by pack animals. Yet, it didn't analyze hauling the supplies on foot, which is obviously doable because field crews will be hiking to those sites.

Nor does the analysis consider hauling rotenone and other supplies on foot if the impact from stock is too great. In other stream and lake poisoning projects, the Forest Service has required that the poisons and motorized equipment be hauled on foot or pack animals. In the Carson-Iceberg Wilderness in the High Sierra, a stream poisoning project that involved 11 miles of stream and one lake, the agency required all equipment and supplies to be transported on foot or pack animal, a distance of approximately five miles (see attached Record of Decision, 2010, for the Paiute Cutthroat Trout Restoration Project on the Humboldt-Toiyabe National Forest and the associated FEIS).¹¹

The bottom line is the State's EA does not carefully consider whether each proposed use of a prohibited activity is "necessary to meet minimum requirements for administration of the area for purpose of this Act," as required by law. The State designed a project that meets its desires for economy, efficiency, time-scale, and its standard operating procedures. None of these are appropriate standards for Wilderness protection or administration. The project must be withdrawn. At the least, the Forest Service must prepare an EIS fully disclosing and assessing the issues described above and any other impacts, rigorously explore a full range of alternatives, and allow for full public review and comment.

Other Wilderness Concerns

Aside from what we have already documented, we are concerned about the timing of this project. Is it during low water? The Scapegoat EA has a proposal for September, yet this one is for August. Is stream runoff that different between the two places?

We also have serious concerns about the agencies using the informal and internal MRDG process—something that is not consistent from agency to agency and has never been through formal notice and comment rulemaking—to circumvent NEPA. The way the federal agencies have designed the MRDG process is fatally flawed and leads to unnecessary trammeling. The first step is often abused because the problem is described so specifically that no other action is possible or, at best, that action outside of the Wilderness will only partially solve the problem, so it is rejected. In this case, the MRDG will likely focus on an area within the Absaroka-Beartooth Wilderness, rather than the entire range of Yellowstone cutthroat in Montana (the real issue of concern, not the Absaroka-Beartooth Wilderness). Given the bias of agencies to manipulate, to manage, the MRDG process reinforces the management paradigm and Wilderness loses. This is

¹¹ An earlier EA and DN were issued but stopped by an injunction. That decision also required the rotenone in the lake to be dispersed using non-motorized boats, unlike the Scapegoat project that didn't consider a non-motorized option in the State's EA for Parker Lake. The MRDG for this proposal does consider a non-motorized boat option. The lake poisoning proposal was dropped in the FEIS and ROD in the Carson-Iceberg Wilderness. Regardless, when the FEIS and ROD were prepared, the US District Court found that the EIS failed to follow the Wilderness Act in looking at impacts to the Wilderness from the use of rotenone. *Californians for Alternatives v. U.S. Fish & Wildlife Serv.*, 814 F. Supp. 2d 992 (E.D. Cal. 2011).

contrary to the Wilderness Act¹² and the rule of statutory construction, which requires the Act to be read in harmony and not in internal conflict.

As yet, there is no MRDG to review, so we cannot comment on specifics. Nonetheless, the fact that the FWP analyzed Wilderness, albeit badly, in this EA suggests that FWP and not the Forest Service may do the MRDG. Further, there is no alternative in the draft EA for doing this project without helicopters and that bodes ill for any future MRDG analysis.

Indeed, the proposed action is not consistent with Wilderness in any way, shape, or form. It is meddling and manipulation, not protection of natural processes. One can't reverse trammeling through more trammeling. One can't restore natural conditions through trammeling. Natural conditions are what flow from an untrammed environment.

While there are other designations that protect landscapes, only Wilderness has a statutory mandate to keep Wilderness untrammed.¹³ The Forest Service is ignoring the fundamental value of Wilderness.¹⁴

The State's draft EA fails to consider other potential impacts to the Absaroka-Beartooth Wilderness. For example, while the State's draft EA suggests replacing the fish that currently live in these waters with Yellowstone cutthroat trout will improve angling opportunities, the FS hasn't considered the impacts this could have on the Wilderness. A 2007 study that reviewed monitoring data of campsite conditions in the Bob Marshall Wilderness Complex found there were many campsites that violated standards (Tanner and Nickas 2007). If angling is improved in the upper Buffalo Creek, the number of visitors may increase with a corresponding increase in campsite impacts. The FS needs to consider how improving angling opportunities in the upper Buffalo Creek could affect campsite conditions and whether it will perpetuate a situation that is already out of standard. Similarly, the analysis should consider how not stocking these waters with fish might improve campsite conditions.

National Environmental Policy Act

A categorical exclusion, as the Forest Service seems to imply it might use on page 20 of the draft EA, is blatantly improper for a project involving multiple prohibited uses and intensive ecosystem and population manipulation in up to 47 miles of streams and 2 lakes in a designated Wilderness. It is appalling and disappointing that Wilderness expertise and leadership within the Forest Service have degraded so severely that we have to argue such an obvious point. This is the second such project proposed by Montana Fish, Wildlife and Parks this year and the second such project considered for categorical exclusion by the Forest Service. The cumulative and precedential effects of the agencies' actions are highly concerning and warrant the preparation of a detailed Environmental Impact Statement.

¹² See Kammer 2013, which makes the case that wildlife manipulation in Wilderness is contrary to the Wilderness Act.

¹³ See Brown et al. 2001.

¹⁴ See Cole, et al. 2015.

NEPA directs federal agencies to prepare a detailed Environmental Impact Statement (“EIS”) for federal actions that may significantly affect the quality of the human environment. 42 U.S.C. § 4332(2)(C). The phrase “human environment” is “interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment.” 40 C.F.R. § 1508.14. The purpose of an EIS is two-fold: 1) to ensure that the agency will have available and will carefully consider detailed information on significant environmental impacts when it makes decisions, and 2) to “guarantee that the relevant information will be made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision.” *Robertson v. Methow Valley Citizens*, 490 U.S. 332, 349 (1989); 40 C.F.S. § 1501.2(b).

1. An Environmental Impact Statement is required.

Pursuant to NEPA’s implementing regulations, to determine whether an EIS is required, federal agencies may first prepare a less detailed environmental assessment. *See* 40 C.F.R. § 1501.4. An environmental assessment should consider several factors to determine if an action will significantly affect the environment, a circumstance that would mandate the preparation of an EIS. 40 C.F.R. § 1508.27. If the agency concludes the action will not significantly affect the environment, it must issue a FONSI to justify its decision not to prepare an EIS. 40 C.F.R. § 1508.13. The FONSI must provide a convincing statement of reasons why the action will not have a significant effect on the environment. *Id.* It is *only* when the proposed action will not have a significant effect on the environment that an EIS is not required. 40 C.F.R. § 1508.13.

The proposed action (the second of such actions proposed this year) poses significant direct, indirect, and cumulative impacts to the environment and to wilderness character. Because the proposed action has the potential to significantly affect a designated wilderness and anticipates a precedent for future connected authorizations, with attendant cumulative impacts (including future poisoning and stocking actions in the watershed), it will result in cumulatively significant impacts, and result in a violation federal law (including the Wilderness Act). A full environmental impact statement must be prepared. *See* 40 C.F.R. § 1508.27.

2. The Forest Service must take a hard look at and disclose the direct, indirect, and cumulative impacts of the project.

NEPA requires the Forest Service to take a hard look at the direct, indirect and cumulative impacts of the project. Under NEPA, the direct impacts of an action must be analyzed based on the affected interests, the affected region, and the locality in which they will occur. 40 C.F.R. § 1508.27(a). Indirect effects of a proposed action are effects that are caused by the action but occur later in time or are further removed in distance. 40 C.F.R. § 1508(b). Cumulative impacts are “the impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” 40 C.F.R. § 1508.7. Cumulative impacts can result from “individually minor but collectively significant actions

taking place over a period of time” and are “the impacts on the environment which result from the incremental impact of the action when added to other *past*, present, and *reasonably foreseeable future* actions regardless of what agency (Federal or non- Federal) or person undertakes such other actions.” *Id.* (emphasis added).

For the proposed action, the Forest Service needs to disclose and analyze the full extent of the fish poisoning and stocking proposal, especially on Wilderness. What are the cumulative impacts of such a stocking program where the streams were historically fishless?

It should also be recognized in the case of the Carson-Iceberg Wilderness in California, an EIS was prepared to analyze the impacts of rotenone use due to a court ruling in 2005 on an earlier EA that found the EA out of compliance with NEPA. The EIS and Record of Decisions were also found to be out of compliance on a later lawsuit with the Wilderness Act. *Californians for Alternatives v. U.S. Fish & Wildlife Serv.*, 814 F. Supp. 2d 992 (E.D. Cal. 2011).

The Forest Service must also rigorously explore and develop alternatives that would lessen environmental impacts, including impacts to wilderness character. 42 U.S.C. § 4332(2)(E). In doing this, the Forest Service must ensure that it has not defined the purpose and need of the project so unreasonably narrow that it precludes consideration of all reasonable alternatives, and it cannot allow another entity’s objectives to “define the scope of the proposed project” in a manner that “necessarily and unreasonably constrains the possible range of alternatives.” *See Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 812 (9th Cir. 1999); *Nat’l Parks & Conservation Ass’n v. Bureau of Land Mgmt.*, 606 F.3d 1058, 1070, 1072 (9th Cir. 2009).

Here, the Forest Service cannot let the State’s objectives override the Forest Service’s primary obligation to wilderness preservation. The Forest Service’s NEPA analysis must stay centered on that obligation and seriously consider a no-action alternative and other alternatives that significantly reduce or eliminate prohibited uses and intentional manipulation of the Wilderness.

The State’s EA also improperly analyzes impacts to Wilderness. This is not the purview of the State of the Montana and the Forest Service cannot rely on this analysis. For example, the State’s EA states:

A comparison of mechanical versus chemical removal with emphasis on projects in designated wilderness provides a detailed assessment of both approaches and confirms that mechanical removal would not be effective, would increase trammeling in wilderness, and would have negative consequences for streams and aquatic life (Endicott 2017) .

EA at 26 and 27. That confuses trammeling with trampling. Electrofishing would be less trammeling in that it would only remove fish, and would not kill other aquatic organisms. That document erroneously conflates the impacts of helicopters and horses and backpacks by failing to recognize backpacks and horses are not incompatible with Wilderness:

Transportation of gear into remote areas also has potential to alter wilderness character, increase the human imprint, and diminish the visitor’s enjoyment of the peace and tranquility. Personal gear, provisions, and field gear are transported by backpack, horse

train, or helicopter. Each mode is a disturbance that increases human presence, causes noise, and results in conditions that may affect enjoyment of wilderness.

Endicott at 14. Yet, it does recognize, “[r]emoval of woody debris” as a serious problem (*Ibid.*). Ironically, the breaching of beaver dams, similar to removal of woody debris, is considered inconsequential in the EA because it is assumed beavers would rebuild the dams. In the case of old dams no longer occupied, this would not be the case.

The states EA misquotes the Wilderness Act:

The proposed action would result in activity in the Absaroka Beartooth Wilderness. The Absaroka Beartooth Wilderness is managed to maintain “wilderness character,” including opportunities for solitude or a primitive and unconfined type of recreation, making “the imprint of man’s works less (sic) noticeable (sic),” protecting indigenous species, and allowing natural processes to regulate ecosystems. Modern civilization and human control that affect ecological systems and processes can compromise wilderness character.

EA at 57. The rest of the brief analysis is equally problematic, no doubt owing to the fact FWP has no responsibility for administering Wilderness and therefore no expertise in doing so.

The EA claims only “the potential for minor, short-term effects on wilderness character.” *Ibid.* Yet, Judge Winmill ruled “Helicopters carry ‘man and his works’ and so are antithetical to a wilderness experience. It would be a rare case where machinery as intrusive as a helicopter could pass the test of being ‘necessary to meet minimum requirements for the administration of the area.’” *Wolf Recovery Found.*, 692 F. Supp. 2d 1264, 1267-68 (D. Id. 2010) .

The EA then dissembles the public by saying “Completing this project improves the natural quality of wilderness character in the long-term by restoring a species native to the geographic area.” EA at 58. Yet, the EA admits this area was historically fishless so the proposal cannot improve the natural conditions of this portion of the Absaroka-Beartooth Wilderness. Instead, the EA again dissembles by mentioning extinction of YCT in the Lamar River outside of the Absaroka-Beartooth Wilderness, ignoring the fact that for something to be the minimum necessary, it must be for the administration of the area for the purpose of this Act.” In other words, the Absaroka-Beartooth Wilderness.

The EA concludes its so-called wilderness analysis of leaving the area fishless with this statement:

The naturalness quality of wilderness character would be improved by returning the upper watershed of Buffalo Creek to its historically fishless condition. However, leaving the watershed fishless would eliminate an opportunity for solitude or primitive and unconfined recreation. A fishery was established in Buffalo Creek 43 years before the designation of the Absaroka Beartooth Wilderness. This fishery contributes to the enjoyment of recreationists and supports the livelihood of guides and outfitters permitted by the Forest Service to operate in the Buffalo Creek drainage.

Finally, leaving the Buffalo Creek drainage fishless in the Absaroka-Beartooth Wilderness would eliminate the establishment of a genetically pure Yellowstone cutthroat trout population in the Yellowstone headwaters watershed secure from hybridization, invasive species, disease, and warming climate effects.

EA at 58. Several errors are made here. The removal of non-native fish could presumably only increase solitude by making an area less popular. It would have no impact on primitive and unconfined recreation as fishing is not a wilderness dependent activity. Whether the proposed action supports outfitting and guiding is irrelevant to whether it is necessary in Wilderness. Lastly, establishing YCT in a historically fishless area does not serve Wilderness.

Other

The EA claims that fish killed by rotenone in lakes would sink due to cooler water (EA at 30, among others). Yet, the lakes at this time of year are full of algae, which suggests warm water (EA at 23). What is the explanation for this?

The EA omits any mention of other fish species (for example, sculpins, whitefish, or brook trout) in the project area, presumably because the falls prevented all fish from ascending Buffalo Creek. One infers from the EA that no fish are native to the Buffalo Creek drainage in the Absaroka-Beartooth Wilderness. That said, were other fish species transplanted to the Buffalo Creek drainage by FWP, other government entities, or private parties? If so, are those fish still found in the drainage today?

Summary

This proposal is fatally flawed and should be scrapped. If this goes forward, the Forest Service must perform a comprehensive EIS that take a hard look at the direct, indirect, and cumulative impacts of this proposal—and all other similar projects proposed in the region—on Wilderness.

Please keep Wilderness Watch informed about this project. We request that you send us copies of decisions and future documents and keep us updated about any additional steps in this project.

Sincerely,



Kevin Proescholdt
Conservation Director

Literature Cited

- Billman, H. G. 2010. *Investigating Effects of the Piscicide Rotenone on Amphibians in Southwestern Montana Through Laboratory Experiments and Field Trials*. Masters Thesis. Idaho State University.
- Billman, et al. 2011. *Effects of Rotenone on Columbia Spotted Frogs *Rana luteiventris* during Field Applications in Lentic Habitats of Southwestern Montana*. Transactions of the American Fisheries Society 140:919–927, 2011
- Billman, et al. 2012. *Toxicity of the Piscicide Rotenone to Columbia Spotted Frog and Boreal Toa Tadpoles*. North American Journal of Fisheries Management 32:781–789, 2012
- Brown, et al. 2001. *Ensuring the Stewardship of the National Wilderness Preservation System*. Pinchot Institute for Conservation. A Report to the USDA Forest Service, Bureau of Land Management US Fish and Wildlife Service, National Park Service, US Geological Survey
- Cole, et al. 2015. *The Definition of Wilderness Character in “Keeping It Wild” Jeopardizes the Wildness of Wilderness*
- Dalu T., et al. 2015. *An Assessment of the Effect of Rotenone on Selected Non-Target Aquatic Fauna*. PLoS ONE 10(11): e0142140. doi:10.1371/journal.pone.0142140.)
- Dunham, et al. 2004. *Assessing the Consequences of Nonnative Trout in Headwater Ecosystems in Western North America*. Fisheries. Vol. 29:6
- Erman, Don C. 2012. *Comment: Rotenone Toxicity to Rainbow Trout and Several Mountain Stream Insects*. North American Journal of Fisheries Management, 32:1, 53-59
- Havlick, D. G. and Biermann, C. 2020. *Wild, Native, or Pure: Trout as Genetic Bodies*. Science, Technology, and Human Values. DOI: 10.1177/0162243920978307
- Joslin, G., and H. Youmans, coordinators. 1999. *Effects of recreation on Rocky Mountain wildlife: A Review for Montana*. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society. 307pp.
- Kammer, S. 2013. *Coming to Terms with Wilderness: The Wilderness Act and the Problem of Wildlife Restoration*, 43 Environmental Law 83, 86 (2013).
- Knapp, R. J. 2004. *Non-Native Trout in Natural Lakes of the Sierra Nevada: An Analysis of Their Distribution and Impacts on Native Aquatic Biota* in USDA Forest Service Gen. Tech. Rep. PSW-GTR-193.
- Knapp, R.J. 1996. *Non-Native Fish Introductions and the Reversibility of Amphibian Declines in the Sierra Nevada* (Forest Service publication noting that the introduction of non-native trout

into naturally fishless lake ecosystems is a major cause of decline in certain amphibians).

Knapp et al 2001. *The Introduction of Nonnative Fish into Wilderness Lakes: Good Intentions, Conflicting Mandates, and Unintended Consequences* Ecosystems 4: 275-278

Knapp, R.K and Matthews, K.R. 1998. *Eradication of Nonnative Fish by Gill Netting from a Small Mountain Lake in California*. Restoration Ecology.

Knapp, Roland J. 2004. *Non-Native Fish Introductions and the Reversibility of Amphibian Declines in the Sierra Nevada* Forest Service Gen. Tech. Rep. PSW-GTR-193.

Landres, et al. 2005. *Monitoring Selected Conditions Related to Wilderness Character: A National Framework*. RMRS-GTR-151

Landres et al. 2015. *Keeping It Wild 2: An Updated Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System*. RMRS-GTR-340

Mangum, F.A. and Madrigal, J.L. 1999. *Rotenone effects on aquatic macroinvertebrates of the Strawberry River, Utah: a five year summary*. Journal of Freshwater Ecology 14:125-135.

Matthews, K.R. and Knapp, R.K. 1999. *A Study of High Mountain Lake Fish Stocking Effects in the U.S. Sierra Nevada Wilderness*. International Journal of Wilderness. Vol. 5 No.1

Pilliod and Peterson 2001. *Local and Landscape Effects of Introduced Trout on Amphibians in Historically Fishless Watersheds*. Ecosystems 4: 322-333

Pister, E.P. 2001. *Wilderness Fish Stocking: History and Perspective*. Ecosystems 4: 279-286

Sampling for Rocky Mountain Tailed Frog (*Ascaphus montanus*) on Overwhich Creek August 2019. Powerpoint.

Schindler et al. 2001. *Alternation of Nutrient Cycles and Algal Production Resulting From Fish Introduction into Mountain Lakes*. Ecosystems 4: 301-321

Tanner, R. and Nickas, G. 2007. *Evaluation of Campsite Impact Monitoring*. International Journal of Wilderness. Vol. 13 No. 1

Yong, E. 2019. *The Overlooked Organisms that Keep Challenging Our Assumptions About Life*. The Atlantic. Available at <https://www.theatlantic.com/science/archive/2019/01/how-lichens-explain-and-re-explain-world/580681/>

