Swan View Coalition *Nature and Human Nature on the Same Path*

3165 Foothill Road, Kalispell, MT 59901 swanview.org & swanrange.org ph/fax 406-755-1379

April 12, 2023

Pete Seigmund
DNRC Kalispell Unit
655 Timberwolf Parkway
Kalispell, MT 59901

Re: Foothills "Restoration" Project, sent as pdf to pseigmund@mt.gov

Dear Mr. Seigmund;

Please accept these comments on your 4/4/23 Initial Proposal: Foothills "Restoration" Project into the public record. We place quotation marks around your word "Restoration" because your proposal would destroy native forests and replace them with commercial forests, rather than restore forests previously damaged by DNRC.

Krause Basin continues to harbor some vestiges of unique Western hemlock forest, including some that should be considered "old-growth," in spite of the extensive logging of DNRC lands shown on the map accompanying your Initial proposal (Exhibit A). No more logging or thinning should occur in the remaining hemlock stands.

Healthy Western hemlock and old-growth forests include dead and dying trees that continue to store carbon and continue to contribute invaluable services to the forest ecosystem as they slowly decay. These trees must be protected, but your proposal instead would target them for removal as "decadent, diseased trees [and] dead and dying trees." The value of these trees to the forest ecosystem is reduced to zero when they are "salvage" logged and your letter admits they are of "low value" as commercial timber, so why log them - other than to make work paid for by a Federal subsidy?

DNRC's past logging from its 2006 Foothills Timber Sale, subsequent "blowdown salvage" logging, and subsequent land "scalping" to promote tree regeneration have resulted in a harshly denuded landscape (see your map, Exhibit A) with rampant invasive weed infestations. It is of no comfort that your letter states "High standard slash clean-up, noxious weed management, site preparation, and pile burning all **may** occur once harvesting has been completed." In other words, they **may not** occur!

We've added emphasis to the word "may" because DNRC failed to provide the promised weed and slash treatments following its Foothills Timber Sale, blowdown salvage, and site preparation "scalping." We have attached as Exhibit B our 2/8/10 letter to Montana Land Board Members (which oversee DNRC) with photos providing the basis of our complaint that "DNRC's recent Foothills Timber Sale converted

hemlock and mixed fir forest into a giant weed patch complete with outlaw off-road vehicle use – after promising in its DEIS and FEIS not to!" Please also see our short video at https://www.youtube.com/watch?v=6zEFTkVN-o0 showing the wind spreading thistle seed even further throughout the timber sale area.

The thinning and logging conducted under the Foothills Timber Sale allowed winds to penetrate the forest canopy and blow down more trees, which DNRC then of course felt the need to "salvage" log with heavy equipment. This again tore up the soil and resulted in the expansion of invasive weeds, not to mention the amount of slash it left on the ground. We've attached as Exhibit C our 8/10/20 letter to DNRC and the Swan Lake Ranger District (USFS) using photos of this and other recent logging as examples of why both agencies should quit "salvage logging" because it simply perpetuates problems while removing stored carbon from the forest.

To recap, DNRC logged the Foothills Timber Sale, which thinned and clearcut native forest and made the remaining trees and nearby forests more susceptible to blowdown as winds more easily penetrate the opened canopy. Then DNRC did more "fuels reduction" and "salvage" logging of the blowdown trees that left the burnable fuels (the limbs) while stealing as logs the bulk of the carbon sequestered in the fire-resistant tree trunks. When will this end; when all the trees are gone?

It is time to stop this downward spiral in carbon sequestration and spreading of invasive weeds that "fuels reduction" and "salvage" logging sets in motion. Studies show as little as 15% of a tree's carbon ends up stored (and only short term) as a wood product, with the equivalent of 85% emitted to the atmosphere through the burning of logging slash, mill residue and transportation fuels. [1, 2]

On the contrary, only 5% or less of the carbon in a large tree is released to the atmosphere during a fire because most of it remains stored in the unburned tree trunk as the limbs and needles burn (along with forest floor plants, litter and duff). [3, 4, 5] We ask that you leave alone what few native forest stands in Krause Basin remain. Please recognize that these forests are healthy, acknowledge that healthy forests include decadent, dead and dying trees, and allow these tree trees to replenish the soil and to provide habitat for essential life from microbes to wildlife, including the insects that birds depend on, as nature intended. [6]

Please read Ellen Horrowitz's article about the value of dead trees and downed logs to the forest ecosystem, in the State of Montana's March-April 2023 issue of Montana Outdoors, attached as Exhibit D. Here are a few bits from that article:

> Standing dead trees (commonly called snags) and downed logs are the overlooked and underappreciated life-giving parts of any forest. Living trees with heart-rot decay, or broke or dead tops, and large dead branches also function as snags. And they too can be filled with wildlife . . . a dead tree often holds more living creatures than a similar-size live tree . . . At the time a tree dies, it has only partially fulfilled its potential ecological function.

So please, recognize that the trees that remain in Krause Basin have far more value left in the forest than they do sent to a sawmill or biomass chipper. Very few of the areas

DNRC intends to log are adjacent to private homes and structures where fuels reduction would be of any help in the event of wildfire – where Forest Service researcher Dr. Jack Cohen finds that "a home's ignition potential during extreme wildfire is principally determined by the characteristics of a home's exterior materials, design, and associated flammable debris related to surrounding burning objects within 100 feet . . . the home ignition zone." [7] Moreover, areas that are also of the highest recreational value but proposed for logging are far distant from structures.

We've attached as Exhibit A to this letter a copy of your map with a few of the "proposed treatment units" and other areas numbered so we can reference them here. On Exhibit A we have marked a "proposed treatment unit" as #1. This area, on both sides of DNRC's closed access road (marked in yellow), consists of beautiful stands of Western hemlock with a relatively open understory – as depicted in this photo:

This "unit" contains healthy hemlock stands with old and young hemlock. They have a promising future, provided DNRC doesn't mess with them! Hemlock stands prefer moist soil conditions and the closed canopy that provides the shade to keep the forest floor moist and cool. In the face of climate change, it is imperative that these stands not be thinned, which would make warming and drying of the forest floor even worse.

The photo below shows what similar Krause Basin stands looked like after DNRC finished "salvage logging" them in 2020:

Logging or thinning in unit 1 would destroy its ability to continue functioning as a healthy Western hemlock ecosystem. You are being deceitful to call this a "restoration" project while simultaneously stating that "treated areas would be site prepped for planting with western white pine and western larch." According to your Proposal, you don't intend to "restore" these forests, you intend to destroy them and replace them with more commercially valuable tree species!

Logging would also destroy the high recreation values found in unit 1. While some motor vehicles do violate the closure of DNRC's main access road (Exhibit A, marked yellow) to motor vehicles, this old road has become a favorite of people seeking non-motorized recreation and quiet native forests in which to renew their spirits. As people walk from Foothill Road up DNRC's access road to unit 1, they experience DNRC's logged areas all of the way. Please don't destroy unit 1, the last vestige of native Western hemlock along this road leading to the Forest Service boundary! Just leave it alone.

We have also marked a second "proposed treatment unit" as #2 on Exhibit A. This forest stand is the only remnant of mature native "hiding cover" remaining along a

major big game trail where wildlife moves up and down off the "knob" in Krause Basin. The rest has been logged. Please do not log or thin unit 2.

We've also marked as #3 an area you aren't currently proposing for "treatment." Thank you for not proposing logging or thinning in this area, which is largely streamside management/no logging zones laid out in the steep ravines during the Foothills Timber Sale. DNRC's map, however, is not a recent enough image to show the heavy-handed logging pictured above and located in the southwest corner of area 3, near the Strawberry Lake Road. We thank you for leaving this area alone and hope you let nature run its course there. The logging conducted nearby is already having enough negative effects due to the increased amount of blowdown in area 3.

All of the "treatments" you propose will have negative effects on recreation and will contribute to the ongoing problems with illegal motorized use of DNRC lands and the proliferation of user-created trails. Wherever heavy equipment is used for logging or thinning, it leaves behind open spaces and "skid trails" that remain vulnerable to continued human uses that will continue to displace wildlife long after the equipment is gone. How does DNRC intend to not increase the trail system in Krause Basin and how does it intend to enforce against increase motorized uses of DNRC lands?

Recreation aside, how will DNRC's "treatments," including thinning, affect threatened species like Canada lynx, which rely on snowshoe hares as their primary prey, which in turn rely on lots of young trees with low hanging branches as their food source? Thinning has been shown to negatively affect lynx. How will DNRC's treatments reduce hiding cover needed by threatened grizzly bears and how will the likely increase in human access affect grizzly bear security? DNRC lands in Krause Basin provide some of the earliest snow-free habitats for bears and other wildlife in Spring.

Your Proposal makes it clear you are seeking Federal funding for this State project via a Western States Wildland Urban Interface Grant, which provides four Federal dollars for each State dollar. (https://dnrc.mt.gov/Forestry/Grants/Western-States-Wildland-Urban-Interface). The National Environmental Policy Act applies to all actions undertaken or funded by the Federal government (42 U.S.C. 4332). How does DNRC intend to comply with NEPA in this project? We ask that DNRC prepare an Environmental Impact Statement according to NEPA procedures, not just MEPA (Montana Environmental Policy Act) procedures.

An Environmental Assessment or lesser analysis of environmental impacts would be insufficient for this Foothills Restoration Project. DNRC found it necessary to prepare an EIS for the Foothills Timber Sale and similar circumstances apply here, except that logging is now being proposed for increasingly scarcer Western hemlock stands and the area continues to suffer from increased weed infestations and decreased wildlife security made worse by the Foothills Timber Sale, subsequent blowdown "salvage" logging, subsequent land "scalping" for tree regeneration, and the harmful effects of climate change. The EIS must include a detailed account of all cumulative effects, including those on neighboring Federal and private lands.

Moreover, and as made clear in Exhibit B, DNRC failed to "reduce the occurrences and spread of weeds," as promised in the Foothills Timber Sale FEIS. DNRC cannot simply

move from one broken promise to the next and from one land-disturbing project to the next, while using Federal money to perpetuate the problems and impacts. A full and adequate EIS prepared under the NEPA is required here.

Thank you for this opportunity to comment and we request a public field tour of the affected Krause Basin area, including the blowdown salvage area pictured above, this Summer.

Sincerely,

Keith

Keith J. Hammer
Chair

Attachments: Exhibits A - D

Endnotes

1. Smith, James E.; Heath, Linda S.; Skog, Kenneth E.; Birdsey, Richard A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p.

2. Gower, Stith T. 2003. Patterns and mechanisms of the forest carbon cycle. Annu. Rev. Environ. Resour. 2003. 28:169–204.

3. Meigs, Garret W.; Donato, Daniel C.; Campbell, John L.; Martin, Jonathan G.; Law, Beverly E. 2009. Forest fire impacts on carbon update, storage, and emission: the role of burn severity in the Eastern Cascades, Oregon. Ecosystems online October 30, 2009.

4. Campbell, John; Donato, Dan; Azuma, David; Law, Beverly. 2007. Pyrogenic carbon emission from a large fire in Oregon, United States. Journal of Geophysical Research, Vol. 112, G040414.

5. Law, Beverly. 2015. Personal communication 10/26/15.

6. Jones, Arwyne (lead editor). 2010. European atlas of soil biodiversity. https://esdac.jrc.ec.europa.eu/content/atlas-soil-biodiversity

7. Cohen J (2010) The wildland-urban interface fire problem. Fremontia 38(2)/38(3):16-22. https://www.fs.usda.gov/rm/pubs_other/rmrs_2010_cohen_j002.pdf

Foothills Restoration Project
MT DNRC Trust lands
sections 21, 27, 28; T28N, R19W

Exhibit A

0 0.125 0.25 0.5 Miles

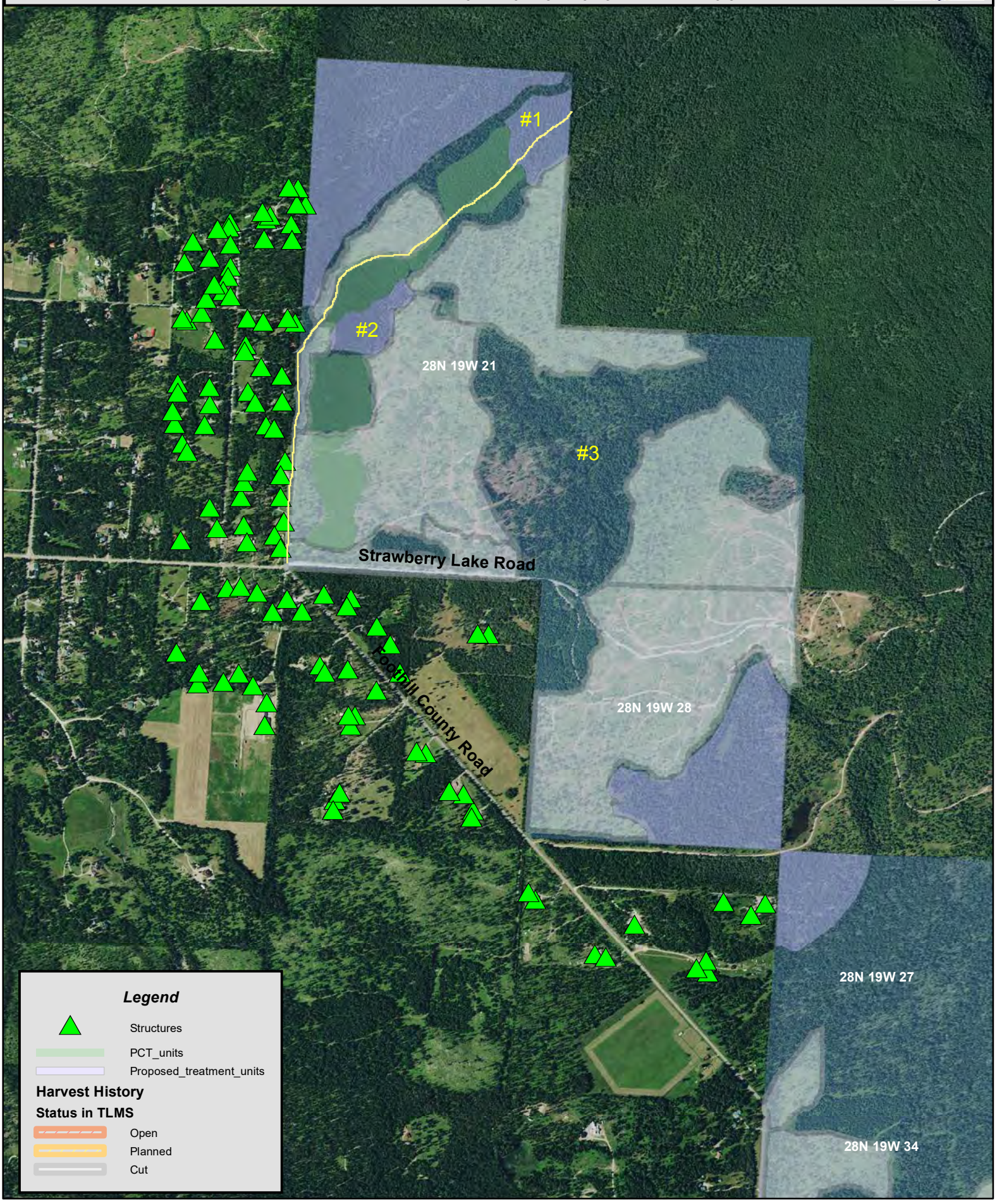


Exhibit B

Swan View Coalition *Nature and Human Nature on the Same Path*

3165 Foothill Road, Kalispell, MT 59901 swanview.org & swanrange.org ph/fax 406-755-1379

February 8, 2010

Montana Land Board Members
(one copy of this letter, photo enclosures and DVD sent to each Member)

Re: DNRC's Foothills Timber Sale replaced native forests with weeds and ATVs after the EIS promised not to!

Dear Governor Brian Schweitzer, Secretary of State Linda McCulloch, Attorney General Steve Bullock, State Auditor Monica Lindeen, and Superintendent of Public Instruction Denise Juneau;

Included with this letter are three pages of photos demonstrating how DNRC's recent Foothills Timber Sale converted hemlock and mixed fir forest into a giant weed patch complete with outlaw off-road vehicle use – after promising in its DEIS and FEIS not to!

The Foothills Timber Sale has spread infestations of weeds including thistle, mullien, spotted knapweed, orange hawkweed, and yellow hawkweed throughout its logging units, even though the DEIS promised to "reduce current weed populations, or contain the area of infestation."

DNRC's Foothills Timber Sale Draft EIS, on page 84, touts its "integrated weed management" as follows:

> "Applying integrated weed management techniques within the sale design would reduce the occurrences and spread of weeds. Grass seeding new and disturbed roads and landings and spot spraying new weed infestations would reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling slash in skid trails and closing additional roads would limit the potential for soil disturbance within these routes during or after logging, reducing the potential for weed establishment. Treating existing weed populations along or within roads with herbicide spray would reduce current weed populations, or contain the area infestation."

The three pages of photos included with this letter and the enclosed 9-minute DVD demonstrate that DNRC neither treated the weeds along all roads nor, and more importantly, were the treatments that did occur the least bit effective in preventing the spread of weeds throughout the logging units. As a result, the logging units have been rendered essentially worthless as wildlife habitat or as a pleasant place for people to hike or walk. Neighbors, like our home office a good half-mile from DNRC Foothills Timber Sale logging units, have been treated to showers of thistle seed on breezy days!

Rest assured the enclosed photos and DVD are not of isolated "worst case" logging units. Weed-infested logging units are now present throughout the Foothills #1 and Foothills #2 Timber Sale areas and we've witnessed similar infestations in the Swan Valley and elsewhere on logged DNRC lands.

Let us be perfectly clear we are not asking for more herbicide; we are asking for less logging of DNRC lands. DNRC's integrity due to past logging in this area was already in question, the public raised the issues of the spread of noxious weeds and ATVs, DNRC promised in its DEIS and FEIS to not spread either, then went ahead and did so!

We urge you to look at the enclosed photos and take just nine minutes to view the enclosed DVD. You really have to see this for yourself to appreciate why DNRC's integrity remains at rock bottom in this neighborhood.

We extend an invitation to any and all of you to take a walk through the Foothills Timber Sale area this spring or summer. The areas shown in the DVD are within a ten-minute walk of Foothill Road and others can be seen from Foothill Road. I can be reached at the above letterhead address and phone, or via email to keith@swanview.org.

Sincerely,

Keith

Keith J. Hammer
Chair

Enclosures: Three pages of photos.
One 9-minute DVD.

cc: DNRC Director Mary Sexton

Exhibit B

DNRC'S Foothills Timber Sale Converted Hemlock/Mixed Fir Forest to a Weed Patch

Above and below, Logging Unit K2 on left and adjacent unlogged forest on right. Keith Hammer photos 8/9/09

Exhibit B

Spraying of weeds along roads drooped weed tops like those in the foreground, but did not contain weed infestations, which spread throughout the Logging Units, here in K2.

Keith Hammer photos 8/9/09

"Applying integrated weed management techniques within the sale design would reduce the occurrences and spread of weeds. Grass seeding new and disturbed roads and landings and spot spraying new weed infestations would reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling slash in skid trails and closing additional roads would limit the potential for soil disturbance within these routes during or after logging, reducing the potential for weed establishment. Treating existing weed populations along or within roads with herbicide spray would reduce current weed populations, or contain the area infestation."

DNRC's Foothills Timber Sale Draft EIS, December 2005, page 84.

Exhibit B

While photographing weeds in Logging Unit K1, left, three motorcycles were photographed violating the law, a common occurrence in spite of DNRC's posting of closure signs and threats of video surveillance.

Keith Hammer photos 8/9/09

Exhibit C

Swan View Coalition *Nature and Human Nature on the Same Path*

3165 Foothill Road, Kalispell, MT 59901 swanview.org & swanrange.org ph/fax 406-755-1379

August 10, 2020

Swan Lake Ranger District
Attn: Shelli Mavor
200 Ranger Station Road
Bigfork, MT 59911

Dept. of Natural Resources and Conservation
Attn: Pete Seigmund
655 Timberwolf Parkway
Kalispell, MT 59901

Re: Comments on proposed March Madness and Jewel Basin Salvage Projects
Submitted to comments-northern-flathead-swan-lake@usda.gov and pseigmund@mt.gov

Dear Folks at SLRD and DNRC;

Based on the recent logging by DNRC in Krause Basin and by SLRD along the Sixmile Lookout Trail, we ask that you conduct no salvage logging within sight of the Echo-Broken Leg, Crater Notch, Hall Lake, and Bond Creek trails. The logging we've seen is heavy-handed, careless and cannot with a straight face be called "fuels reduction," as the big logs that don't generally burn in a wildfire are being removed while the more flammable small trees and slash are being left behind.

We are disappointed to see SLRD wants to use DNRC under the 2014 Farm Bill's Good Neighbor Authority to help implement its March Madness logging project. The messes left behind in Krause Basin and on Sixmile Mtn. make DNRC and SLRD look like anything but good neighbors.

On the following page are two photos of what Krause Basin DNRC land looks like after it was recently "cleaned up" by logging:

Exhibit C

Below is a photo of the adjacent forest with some blown-down trees that weren't "cleaned up" or "salvaged" by DNRC in Krause Basin:

Like many wildlife species, we prefer diverse forests with blown-down trees to the mess left by DNRC!

On the following page are two photos of the Sixmile Lookout Trail following logging under SLRD's "Weed Lake Landscape Restoration Project:"

Exhibit C

Below is a photo of Sixmile's trailside forest prior to logging:

It's pretty obvious that the commercially valuable logs that resist fire were removed and the more flammable small trees and slash were left behind, even though being touted as "fuels reduction" logging. Like many wildlife species, we prefer the unlogged, diverse forest to the "restored landscape."

To add insult to injury, both DNRC and SLRD did unnecessary damage to residual trees in the haste to get commercially valuable logs to the mill. See photos on the next page:

The photo above shows damage caused by ground-based log skidding on DNRC's Krause Basin land. The photo below shows damage caused by line/cable yarding of logs along SLRD's Sixmile Lookout Trail.

We've already asked SLRD that it not "salvage" log blown-down and other trees in its March Madness proposal, especially along trails used by the public to enjoy the woods. We here repeat that request and ask that these public trails and the forests along them be fully protected. And, if SLRD installs any culverts or bridges in Patterson Creek, please remove them post-logging so they do not encourage motor vehicle trespass into the Peterson/Patterson/Bear Creek area from neighboring DNRC land on those closed Forest Service roads.

We've also already asked DNRC to not log within sight of the Echo-Broken Leg and Crater Notch trails (and we repeat that request here). We did so in our comments on the 2006 Foothills Timber Sale. DNRC's Greg Poncin responded favorably by moving logging units downhill and out of sight of the Echo-Broken Leg Trail. We made a similar request of DNRC's 2014 Birch Creek Salvage, but to no avail. F.H. Stoltze was instead permitted to take an estimated 55 loads of logs from DNRC lands around the Crater Notch trail via convenient access through its neighboring private lands.

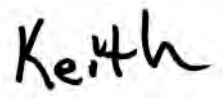
So it concerns us that SLRD now wants to partner up with DNRC and perhaps let DNRC handle some of the March Madness contracting, as it did for the Flathead National Forest's Taylor Hellroaring timber sale, which was sold to F.H. Stoltze. (https://www.fs.usda.gov/detail/flathead/news-events/?cid=FSEPRD766894)
While the Forest Service, DNRC and F.H. Stoltze may consider themselves "good neighbors," they are all three being anything but good neighbors to the public whose trees they are logging and whose trails they are trashing!

The logging jobs DNRC and SLRD have done in Krause Basin, Birch Creek and on Sixmile Mountain demonstrate an unwillingness to keep logging out of sight of trails the public relies on to enjoy time in the woods. The photos we've included with this letter also demonstrate this logging is profiting from the removal of large tree trunks as logs while leaving the more flammable small trees and logging slash behind.

The logging you propose in your March Madness and Jewel Basin salvage projects will most certainly leave the woods looking worse and in poorer health than they are now. Invoking the Good Neighbor Authority will do nothing but sprinkle congressional holy water on the "good old boy" network that has resisted needed reform of public forest management for many, many decades.

It's time to protect public forests, even "damaged" ones, along with the public's ability to enjoy them. Your proposed cures under the guise of "salvage" and "fuels reduction" are worse than the "damage and disease" you profess to cure. It is simply unacceptable.

Sincerely,



Keith J. Hammer
Chair

Exhibit D

LIFE AFTER DEATH

The amazing productivity of dead trees, both standing and fallen. By Ellen Horowitz

High on a ridgetop, the silver skeleton of a wind-scoured pine beckoned. As I walked beneath its thick, gnarly branch stubs, my hand followed the sleek contours of the tree's twisted trunk until I came upon an old woodpecker hole. It was late summer, nesting season was long over, and I couldn't resist the temptation to ask, "Hello, is anybody home?" Feeling certain no one was, I followed the question with a gentle knock. The unexpected answer—a bat—shot out of the hole.

I don't know who was more surprised—the bat or me—but that long-ago moment still reminds me of just how many animals rely on dead trees. In Montana, more than 60 species of wildlife use dead trees or logs for feeding, nesting, roosting, resting, denning, or drumming.

Standing dead trees (commonly called snags) and downed logs are the overlooked and underappreciated life-giving parts of any forest. Living trees with heart-rot decay, broken or dead tops, and large dead branches also function as snags. And they too can be filled with wildlife.

Everyone knows that healthy live trees are wonderful for wildlife. Birds nest in their branches, insects eat the leaves, and the trees convert carbon dioxide into oxygen that all life on earth needs. What makes dead trees so valuable to wildlife are the small and large holes and cavities that provide shelter for birds, squirrels, bats, and even bears. Openings also allow moisture and fungi to get inside the structure and trigger rot and decay that attract insects eaten by wildlife.

"Believe it or not, a dead tree often holds more living creatures than a similar-size live tree," says Torrey Ritter, regional nongame wildlife biologist for Montana Fish, Wildlife & Parks in Missoula.

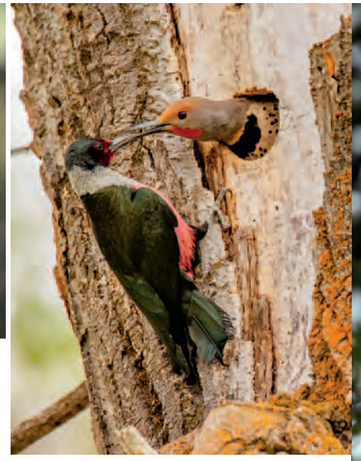
Woodpeckers, with their chisel-like bills, are renowned for drilling holes in trees, which they and other wildlife use for roosting and nesting. Fungi that cause decay also create cavities that house dozens of species. These openings can range in size from small knotholes to entire hollow trees. Almost any injury to a tree's protective bark—caused by fire scars, lightning strikes, storm damage, insects, antler rubs, bears, and humans—can produce openings for ecologically essential fungal spores.

Fungi perform the critical job of decomposing and recycling forest nutrients. Some mycorrhizal fungi transport nutrients to trees and other plants to help

Little brown myotis

LEFT TO RIGHT: JEREMI HOLLMAN; GARY KRAMER

PREDATORS' PREFERENCE Forest carnivores like American martens (above) and fishers den in fallen tree cavities and prey on small mammals attracted to logs.



THE LIVING FOREST Organisms that use dead trees and stumps include, from left to right, various mushroom species, red-breasted nuthatches, Lewis's woodpeckers, and northern flickers.

them grow. But it's the decay-creating fungi that give "primary" cavity nesters—woodpeckers, flickers, and sapsuckers—a chance to make their holes. Without decay, even the strongest woodpecker wouldn't be able to excavate tree trunks. Some studies suggest that woodpeckers may even "soften" dead trees by transporting fungi they pick up on their beaks from infected trees.

KEYSTONE SPECIES

Woodpeckers—a family that includes flickers and sapsuckers—evolved to drill tree holes. Their stout bills pound into and gouge out wood, and their musculoskeletal structure prevents whiplash and headaches from repeated hammering. The birds' toes provide grip for clinging and walking up tree trunks, and the powerful tail braces the bird's lower body against the tree to offset the forward strokes of the head.

> "Believe it or not, a dead tree often holds more living creatures than a similar-size live tree."

Woodpeckers are often described as keystone species or keystone architects because their holes are essential for a variety of "secondary" cavity users. These songbirds, raptors, waterfowl, and small mammals cannot excavate new cavities themselves but use existing ones for nesting, denning, or shelter. Researchers estimate that about 25 percent of bird species nesting in the Northern Rocky Mountain forests are cavity nesters. "Loss of a keystone species like the pileated woodpecker could lead to cascading effects including harm to other species," Ritter says.

CREATING MORE CAVITIES

Nest cavities provide better protection from the elements and predators than open nests. A typical woodpecker nest consists of an entrance hole and a short horizontal tunnel leading to a vertical pouchlike chamber within the tree trunk. The entrance is chiseled out just wide enough for the woodpecker to slip through.

Most woodpeckers excavate a new nest hole each spring, leaving their previous years' models as turnkey homes for other wildlife. Western and mountain bluebirds, tree and violet-green swallows, and house wrens are just a few of the secondary cavity nesters that use the old nests. Once these birds claim a suitable abode, they build their own nest atop the woodchips left behind by the original architect and occupant. Chickadees and nuthatches also use woodpecker or natural holes (though both can whittle their own original nest cavities in soft, decayed wood if necessary).

North America's largest woodpecker, the pileated, needs large-diameter trees for its massive interior nests. The pileated's egg-shaped entryway measures about 4 inches high and 3.5 inches wide. The spacious nesting chamber, chiseled into decaying heartwood, averages 18 to 24 inches deep and 8 inches wide. It takes three to six weeks for the woodworkers to complete construction. The cavernous nests are later used by wood ducks, buffleheads, goldeneyes, and hooded mergansers, as well as northern pygmy, northern saw-whet, flammulated, screech, and boreal owls.

Studies in northwestern Montana's western larch (tamarack) forests show that a 20-inch-diameter tree is usually more than 200 years old, and that pileated woodpecker nest trees average 29 inches in diameter. Unfortunately, such old, large trees are uncommon in many managed forests.

Northern flickers are Montana's second largest woodpecker and the one most common in many forests. Some smaller ducks and raptors make do with a flicker's more cramped quarters when nothing else is available.

A large tree perforated with cavities becomes a high-rise condo for multiple species if there's sufficient distance between holes.

Mountain bluebird

Northern flying squirrel

Ellen Horowitz is a writer in Columbia Falls.

FAMILY AFFAIRS Snags can provide homes for dozens of bird species, including (above left) pileated woodpeckers and (above right) wood ducks.

CLOCKWISE FROM TOP LEFT: RICK CLARK; ALEX BADYAEV; ERIN BRAATEN; DONALD M. JONES

CLOCKWISE FROM TOP LEFT: DANIEL ELLISON; GARY KRAMER; KERRY T. NICKOU

Researchers in northwestern Montana documented a red-naped sapsucker, a tree swallow, and a mountain chickadee all nesting in a single western larch snag. Researchers in the Bitterroot Valley documented Lewis's woodpeckers nesting in a tree with one to three other bird species, including an American kestrel. Near Missoula, researchers recorded a northern pygmy owl and a northern saw-whet owl simultaneously nesting in the same snag. The pygmy owl took the west-facing cavity about 8 feet up while the saw-whet chose an east-facing cavity 19 feet above ground level.

Birds aren't the only wildlife using tree cavities. Shannon Hilty, FWP regional nongame wildlife biologist in Great Falls, says that at least eight of Montana's 15 bat species use cavities or crevices within snags for roosting. "These features provide vital habitat for female bats raising pups," Hilty says. Flying squirrels, tree squirrels, and American martens use tree cavities for denning, resting, and protection. Raccoons, porcupines, short-tailed weasels, mice, and bushy-tailed woodrats also shelter in woody openings. The list goes on and on.

OTHER USES OF SNAGS

Almost every part of a dead tree is a type of habitat. Exposed high branches provide hunting perches for kestrels, hawks, and bald eagles. The Lewis's woodpecker, unlike most members of its family, launches from its perch to snatch insects midair before returning to the branch to dine.

Treetops are used for musical performances in springtime. An olive-sided flycatcher's easy-to-recognize song resembling the phrase, "*Quick, three beers*," carries long distances from a high perch. Some woodpeckers select trees with large, hollow branches as drumming towers to advertise territory and announce themselves to mates or potential mates.

A broken-topped tree is one of the few natural platforms that can support an osprey's large stick nest. Great gray owls also use large, broken-topped snags for nesting, if located near a forest edge suitable for hunting.

Flocks of Vaux's swifts require large, hollow old-growth conifers or cottonwoods for communal roosting and nesting. The opening and cavity must be big enough to allow dozens or even hundreds of birds to fly in and out. As nightfall approaches, the swifts begin to swarm, moving in unison through the sky until making a final spiraling descent into the tree. Once inside, they cling vertically to the interior walls with their tiny claws.

Bears will overwinter in hollow or partially hollow trees, or in tree openings as high as 50 feet above ground. In 2018, a webcam in Glacier National Park kept tabs on a black bear waking up from his long winter sleep in a hollow tree (see the video by scanning the QR code on the "Hollow homes" sidebar, page 27).

Another habitat is hidden where loose bark recedes from the trunk of a large dead or dying tree. This specialized space is used by brown creepers, the only North American birds that construct nests behind sloughing bark. Several bat species, including the long-eared myotis, little brown, and silver haired, also squeeze themselves behind loose snag bark to roost.

MORE CRITTERS Clockwise from top left: American kestrel emerging from a cavity; ruffed grouse drumming on a downed log; boreal toad in a charred stump depression that gathers water; yellow-pine chipmunks keeping an eye out for predators; bull trout hiding from otters and ospreys under downed dead branches and logs; a great gray owl with two chicks in a broken-top tree.

CLOCKWISE FROM TOP LEFT: JAY STYLES; DONALD M. JONES; JEREMY ROBERTS; JOHN LAMBING; PAT CLAYTON; DONALD M. JONES

WHEN A SNAG TOPPLES

Even when a dead tree falls, its story continues. As world-renowned forest ecologist Jerry Franklin, a professor emeritus at the University of Washington in Seattle, wrote, "At the time a tree dies, it has only partially fulfilled its potential ecological function." Even forests with vast numbers of dead trees—like those hit by severe beetle kill or wildfire—are considered healthy by forest ecologists.

For instance, male ruffed grouse conduct their springtime drumming display atop downed logs—something they can't do when a tree is live and upright. Juncos frequently choose nest sites in the space underneath partially supported logs.

Logs, stumps, and large fallen tree limbs create miniature overpasses and highway systems that allow squirrels and chipmunks to race across the forest floor, as well as places for small rodents to sun, eat, and watch for predators.

This "coarse woody debris," Hilty says, is especially critical to voles, shrews, and mice that remain active throughout winter. "It can create a more extensive 'subnivean' [beneath the snow] space that provides foraging habitat and pockets of different sizes and pathways." American martens and fishers in turn hunt the small rodents in the woody structure.

> "At the time a tree dies, it has only partially fulfilled its potential ecological function."

Fish also benefit from dead trees that topple into mountain streams and rivers. Bull trout, especially, use this underwater cover to hide from predators like otters and ospreys. Wind blows ants, beetles, and other insects that feed on downed trees and branches into streams, providing essential protein for many fish species.

Toppled trees also create stream pools and side channels, while rootwads of fallen trees are used by otters, mink, American dippers, Pacific wrens, and other animals.

Many other forest organisms find hidden habitats within and beneath logs. Fungi begin the decomposition process. Mites, spiders, snails, slugs, millipedes, and pill bugs are detrivores that dine on the decaying organic matter. Carpenter ants, often mistakenly blamed for eating trees, are simply taking advantage of easy digging within a log or stump's soft, fungus-infested heartwood to build their nests. In the forest, carpenter ants play a beneficial role by preying on other insects and recycling organic matter. They also provide protein-rich food for pileated woodpeckers and bears.

ORGANIC MATTER EATERS Centipedes, millipedes, sow bugs (above), slugs, snails, earthworms, and a wide range of insects, such as earwigs, ground beetles, and springtails, are detrivores that eat dead trees and provide food for birds and other wildlife.

Another thing logs do is soak up water like a sponge, helping them retain moisture even during summer drought. Salamanders, rubber boas, and boreal toads burrow or shelter beneath the cool, moist logs to wait out the heat of the day.

Finally, logs turn into soil. Slowly decomposing over the course of decades or centuries, the downed tree trunks enrich the forest floor while supporting the growth of lichens, mosses, and mushrooms on their surfaces. In moist forests, they serve as nursery logs, providing seedbeds for other plants, including trees, to get their start

"Dying and dead wood provides one of the...greatest resources for animal species in a natural forest," wrote Charles S. Elton, a British ecologist and contemporary of Aldo Leopold. "[If] fallen timber and slightly decayed trees are removed, the whole system is gravely impoverished of perhaps more than a fifth of its fauna."

The next time you come upon snags while walking through the woods, don't mourn for the dead trees. Celebrate the life those vital habitats are giving to wildlife today—from songbirds to black bears—and will continue to give, even when toppled and decayed, far into the forest's future.

RENEWAL Even trees grow from old, dead trees, completing a full circle of forest life.

Hollow homes

A "hollow" tree is defined as one with such advanced decay throughout its interior heartwood that a hollow core forms. Biologists consider large-diameter (20-plus inches) hollow trees especially useful to wildlife. Studies in northeastern Oregon indicate that roosting and nesting Vaux's swifts require a tree averaging 27 inches wide and 85 feet tall. Hollow treetops for denning black bears average more than 43 inches wide and 57 feet high.

Hollow snags and hollow logs always start with a live tree. The hollowing process begins when the live tree is damaged. Strong winds, for example, may snap off a treetop or large branch, exposing it to airborne heart-rot fungal spores. Deep fire scars at the tree base can also create an opening for fungal spores. These fungi do their work only in live trees.

After many decades, the decayed heartwood detaches from the sapwood, resulting in a hollow chamber. Since the live outer sapwood isn't affected, the tree retains its hard, protective shell while continuing to grow. In other words, a tree can be hollow and still very much alive.

A black bear peers out from its den in a hollow log.

Because they look intact from the outside, hollow trees can be tough to identify unless there's an obvious opening. But they are worth finding, because these trees always house some sort of wildlife. Look for live trees with:

- a broken top,
- evidence of multiple pileated (or other) woodpecker cavities,
- appearance of shelf fungi close to branch stubs or live branches, or
- hollows (knotholes) where large branches have broken off. ■

Scan the QR code at left to see a sleepy black bear emerging after hibernation in a large Glacier National Park snag cavity.

CLOCKWISE FROM TOP LEFT: KATJA SCHULZ; SHUTTERSTOCK; RICK CLARK