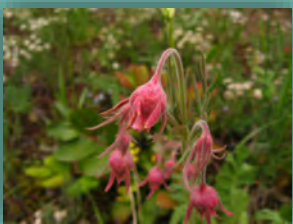
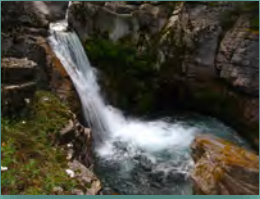


Bob Marshall Wilderness Complex

2021 Newsletter

VOLUME 30

Invitation from your lead Ranger



Sidebar photo credit:
Laura Mills Nelson

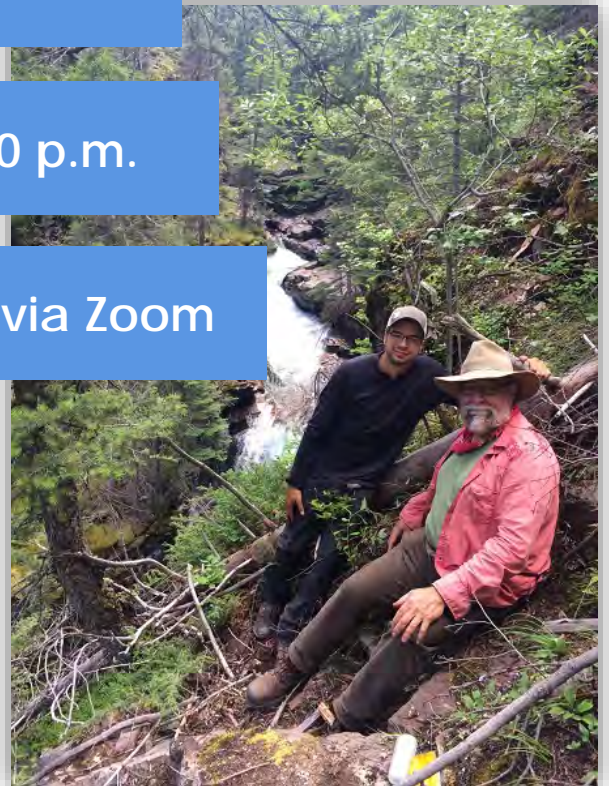
We look forward to visiting with you at our annual Limits of Acceptable Change (LAC) public meeting and information-share this spring! This year, the meeting will be in a virtual format and will take place on **Saturday, April 17th from 9:00am to 12:00pm**. I hope you can join us to share news and exchange ideas. Please email laura.millsnelson@usda.gov to obtain the virtual meeting link. I know I speak for all the Complex staff when I say that we value you leaning in with us on managing this magnificent treasure.

SATURDAY, April 17th

9:00 a.m. — 12:00 p.m.

Virtual meeting via Zoom

Scott Snelson,
2021 BMWC Lead Ranger
Spotted Bear RD,
Flathead NF





Introduction *from your Lead Ranger, Scott Snelson*

This season I take over the lead Ranger position for the Bob Marshall Wilderness Complex. Hats off to my predecessor, District Ranger Mike Muñoz from the Rocky Mountain District. High praise to him for playing the coordination role between the Hungry Horse/Glacier View, Lincoln, Seeley Lake, Spotted Bear and Swan Lake Ranger Districts that are charged with stewarding this special place. Kind of a bit of a thankless task that Mike performed for us over the past three years. I lavishly appreciate him herein. I'll do my best to fill the shoes.

As the winter season ebbs, the Spotted Bear Ranger District (SBRD) is already in high gear getting ready for our return to the District Office at the confluence of the Southfork of the Flathead and Spotted Bear Rivers in mid-May. While the simple return to Spotted Bear Ranger Station brings satisfaction enough, we'll be sharing the facilities with about double the personnel we have had in recent years thanks to the Great American Outdoors Act (GAOA). More on that inside.

Funding provided by this landmark legislation allows for the complex Districts to restore trails personnel to levels not experienced in years, as investments in recreation infrastructure have steadily declined. More folk means more work. More trails cleared, more access to the public's lands for both guided and unguided enjoyment.

SBRD is not alone in record visitation to the District this past season. The same can be said for at least the South Fork River Corridor and the Wall. While the pandemic and more limited access to Glacier National Park might have had more folks heading our way, the trend was there before the pandemic. River use on the South Fork continues to be more popular every year, and pack rafters are traversing historically less-used trails to access float trips, changing use patterns across the complex. My guess is this should be expected to continue for the foreseeable future.

The Flathead National Forest and Glacier National Park are updating the Comprehensive River Management Plan, which includes the three forks of the Flathead River and guides our management of the river. The project was put on hold several months ago due to budget. Recent commitments from the Washington Office have funded the completion of the plan which includes the Wilderness portions of the Middle and South Forks. Consideration of a mandatory trip log for river users is being explored. While unrestricted access is a high value, so is maintaining solitude and experience quality. Your help in grappling with the hard trade-offs is vital. I hope you'll consider engaging or re-engaging in this planning effort which will restart this fall. [3 Forks of the Flathead Wild & Scenic River Comprehensive River Management Plan Page.](#)

One of the new administration's priorities for the agency is to assist in recovery from the pandemic. I believe the heavy use of the Forests in the Complex is already providing for vital renewal of the spirit for most of our visitors. Our partners in the outfitting and guide services continue to play an important role in the public's recovery by making these public lands more accessible to those otherwise unlikely to enjoy the wonder of the place. Trail crews, volunteer partners and the USFS continue to provide for access of private parties ready for adventure. I celebrate with you the remarkable gift we've set aside for ourselves and generations that follow. Now, perhaps more than ever, the Bob Marshall Wilderness Complex offers a magical, blessed place of peace and healing. Get out there and fill your soul. We'll see you down the trail.



Meet Your New BMWC Managers

Rocky Mountain Ranger District

Backcountry Happenings with Nate Emer & Ellie Fitzpatrick

By Yvonne Geisel, Administrative Clerk

The Rocky Mountain Ranger District had the great pleasure of filling a couple of positions in the Trails/Wilderness Program and we thought you'd enjoy getting to know the folks we hired, virtually. I "interviewed" them with more social distance than a Zoom meeting.

Get to know Nate Emer, Trails Technician who started last July 5th, and Ellie Fitzpatrick, Wilderness/Trails Technician who joined us August 2nd, via their answers to my questions.



Nate Emer, Trails Technician



Ellie Fitzpatrick, Wilderness/Trails
Technician

See the interview on the next page!



Managers continued ...

Interview with Nate Emer & Ellie Fitzpatrick

Yvonne: *Where did you grow up?*

Nate: Kenosha, Wisconsin.

Ellie: I was born in Helena and lived there for the entirety of my adolescent life. It was a great place to be a kid. I lived on the west side of town and went to Capital High School.

Yvonne: *When did you start your career with the FS and in what capacity?*

Nate: I started in 2008 on the trail crew at Rocky Mountain Ranger District.

Ellie: I started as a seasonal employee on the Helena Ranger District in Fire right after I graduated high school. I spent my summers throughout college going back to Helena to work for the District for six seasons. I took a break from the FS in 2014 but returned to work on the Lincoln Ranger District in 2015 for Josh Lattin as part of the Developed Recreation program. I went on my first Forest Service backcountry hitch that summer to the Upper Landers area of the Scapegoat and loved it. The next year I applied for one of the wilderness ranger positions in Lincoln and got it; I was in that position for three seasons. I then went to work as a wilderness ranger in the south zone of the Frank Church Wilderness in 2019 (until starting) here in Choteau.

Yvonne: *What drew you to the FS?*

Nate: The chance to see the backcountry and get paid doing it.

Ellie: The prospect of paying for college drew me to apply for a fire job, originally. The comradery I experienced working in crew settings, as well as the ability to work outside in many different capacities, kept me coming back.

Yvonne: *What is the one thing you find most challenging about your work?*

Nate: Besides dealing with my aging physical infrastructure, probably to not take for granted the beautiful places I work, and the freedom that my job allows me.

Ellie: I miss my family and friends dearly when I am in the backcountry or out of service for extended periods of time, and, while working in fire was a great way to travel to areas I would never normally visit, it also got old being on the road sometimes. I've been fortunate, however, to make some wonderful, lifelong friends on the job, and I carry them with me always!

Yvonne: *What is the most rewarding part of your work?*

Nate: A project wrapped up, a trail cleared, and balanced loads.

Ellie: I really enjoy helping people have fun in the woods (especially kiddos!). It is gratifying when you can point someone in the right direction, offer advice or local knowledge, educate future generations about things like wildflowers, or animals, or the best snacks to bring in your backpack/saddle bags. The public land and resources we have are so important, and it's great when people are able to enjoy them and learn about them.

(Continued on next page...)



Managers continued ...

Interview with Nate Emer & Ellie Fitzpatrick

Yvonne: *What message would you like to give to the public?*

Nate: If you pack it in, please pack it out. Contrary to popular belief, tin foil and beer cans do not burn. Bring a map. Also, ask me questions, I am always happy to give suggestions and directions to those I run into in the backcountry. Many folks show up and have a rough go, when one phone call or email could point them in a better direction.

Ellie: I would tell folks coming to the HLCNF, or any forest for that matter, to tread lightly. There's a lot of us out there these days!

Yvonne: *One last question for Ellie only. Why Ellie? Your Forest Service email is to Elise.*

Ellie: Ellie is a nickname that was given to me at birth, and it just stuck. I've never really used my legal name.



Spotted Bear Ranger District

Shannon Connolly, *Recreation Manager*

Shannon Connolly has returned to the BMWC after seven years of adventures on other Forests. Shannon started her Forest Service career with the Rocky Mountain Research station and bounced around the Complex and Glacier NP from 1999-2005 working on lynx, grizzly bear DNA, small mammals and other wildlife projects. In 2005, Shannon switched to recreation and put down some roots in Seeley Lake until 2014. Then she went to the Bridger Teton National Forest in Jackson, WY to work as the Recreation Program Manager until 2017. Shannon also worked on the Chugach National Forest in Anchorage, AK as the Recreation, Lands, Minerals, and Heritage Staff Officer for the last couple of



years before deciding to come back home. Although new to the Spotted Bear Ranger District, Shannon is no stranger to the BMWC, and we're glad to have her back!

Managers continued ...

MT Fish, Wildlife & Parks

Meet Ben Chappelow, Montana Game Warden

I moved from Shelbyville, Indiana when I was 18 years old to Missoula to attend the University of Montana. While in college, I was active in both the Forestry Club and the Student Chapter of The Wildlife Society. I was a volunteer for Montana Fish, Wildlife & Parks during college and helped with various projects, mainly for bear manager Jamie Jonkel. For two summers, I worked in the backcountry of New Mexico as a guide for the Boy Scouts of America at the Philmont Scout Ranch High adventure base. I took crews of scouts on 10-day backpacking trips and taught them wilderness skills. I also spent a summer working for the Charles M. Russell Wildlife Refuge as a seasonal tech working on sage grouse and black footed ferret conservation. I also spent a summer working for South Dakota State University surveying wetlands in the prairie pothole region.



After graduating in the class of 2006 with a Bachelor of Science in Wildlife Biology, I worked a joint job with FWP and the Seeley Lake Ranger district as a biological technician. During that time, I worked on common loon, and harlequin duck conservation. I also worked on enforcing the food storage order in the campgrounds on the district. That fall I worked for FWP as a Block Management Tech, working with landowners in the Blackfoot valley.

(Continued on next page...)



Managers continued ...

Meet Ben Chappelow, Montana Game Warden

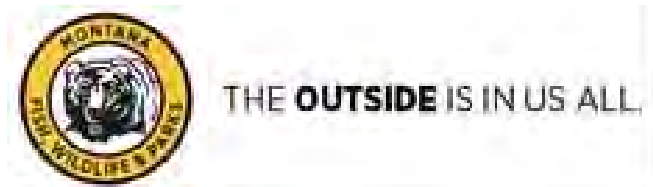
In May of 2007, I was hired as a seasonal water safety officer for FWP in Region 1 (northwest Montana) patrolling lakes in the valley for water safety violations. After the summer season, I was hired on as a game warden and spent the next four years as the warden assisting the Montana Department of Natural Resources and Conservation in the region.

Beginning in 2012, I transferred to the Eureka warden district and had the opportunity to work on a variety of enforcement and wildlife management issues. I spent a lot of time on grizzly and black bear conflicts. I also spent a lot of time on various urban wildlife issues such as game damage, lion and wolf depredation on livestock and pets. I helped implement elk shoulder seasons in the area by working extensively with local landowners and ranchers.

I had the privilege of taking a few trips into the Bob Marshall Wilderness with long time game warden Perry Brown. I owe a lot to Perry for his mentorship on packing and horsemanship skills. Working with Perry gave me the confidence to apply for the Columbia Falls district that I was selected for in the summer of 2020. This district includes the Hungry Horse and Spotted Bear Ranger districts in the wilderness complex.

I am looking forward to working in the area and having a positive impact on the wilderness users and the staff that work there. Hopefully, I'll see you on the trail.

Ben Chappelow
Phone: 406-250-2097
Dispatch: 1-800-TIP-MONT
bchappelow@mt.gov





The Great American Outdoors Act (GAOA) & The Bob -- Updates from Lincoln Ranger District --

By Forest Moulton, *Lincoln Ranger District*

The Great American Outdoors Act (GAOA) was signed into law this past August to permanently fund the Land and Water Conservation Fund and address a maintenance backlog on federal public lands. For the Bob Marshall Wilderness Complex (BMWC), a trail maintenance initiative was selected for funding that attempts to address our maintenance backlog. This initiative could be funded for up to five years, which would provide some stability for our trails and Wilderness programs for the near future. The BMWC managers appreciate all the advocacy shown by our partners and the public that led to the GAOA becoming law. These additional GAOA funds will help make up for the continual decrease in funds that reach the ground and new budget directives that prohibit specially allocated Forest Service funds to be spent on hiring Forest Service employees.

For the 2021 field season, the BMWC GAOA project will provide funding for approximately 40 seasonal positions across the Complex as well as approximately 45 weeks of MCC crew work on the Hungry Horse, Spotted Bear, and Seeley Lake Ranger Districts. Several districts will also enter into agreements with other partner groups including the Bob Marshall Wilderness foundation to get additional work done. In addition to workforce benefits, GAOA funds will allow us to lease vehicles and maintain our stock herds by purchasing new animals and helping with hay costs and farrier services. Overall, the



Jackson Holte giving the string a rest at the top of the hill, packing in supplies for deferred maintenance on the CDT

Complex will see most of the District trails and Wilderness programs made whole or close to whole from these additional GAOA funds. We should be able to accomplish much needed deferred maintenance tasks across many trails throughout the Lincoln Ranger District and across the Complex.

(Continued on next page...)

Lincoln Ranger District, continued...



Alec Harper making some sections of the CDT trail more stock-friendly in the Valley of the Moon.

2021 is bringing some significant transition to the recreation department at the Lincoln Ranger District. After 6 years of running the whole ship, District Ranger Michael Stansberry has left to become the Forest Supervisor for the Chippewa National Forest in Minnesota. Tory Kendrick, the Base Manager of the Missoula Smokejumper Base, is currently detailed into the District Ranger position behind Michael. Also, after more than 6 years of running the recreation program in Lincoln, Josh Lattin has left to take his

talents to the Phillipsburg Ranger District of the Beaverhead-Deerlodge National Forest. Forest Moulton, the Trails Program manager, is currently detailing for Josh. Chelsea Catalano is detailing behind Forest to complete all the hiring and other prep work for the season. Josh and Michael's experience and leadership will be missed in Lincoln, and we hope the new vacancies will be filled permanently soon.

Even without the staff transition at the Lincoln Ranger District, 2021 is shaping up to be busy year inside the Bob and out.



Tory Kendrick, detailed District Ranger

On the trails side of things, we will have two 4-person trails crews that will tackle a variety of routine and deferred maintenance. We will also host several project with partner groups, including three with the Bob Marshall Wilderness Foundation, two with the Montana Conservation Corps and one with the

(Continued on next page...)

Lincoln Ranger District, continued...

Montana Wilderness Association. The major projects in the Wilderness will include maintenance of several puncheons on the Mainline Trail 481 between the Heart Lake and Red Mountain junctions. These puncheons need approaches and running boards installed to make them more approachable and resilient for stock. A second project will tackle puncheon and turnpike construction on the Arrastra Creek Trail 482. Lastly, a specific GAOA funded project will attempt to reestablish the Copper Lakes side of the Stonewall/Copper Lakes Trail 485. This will reopen an incredibly scenic trail that will connect a trailhead close to the town of Lincoln through the Copper Bowls to the highest point in the BMWC, Red Mountain.



Red Mountain and Copper Bowls in winter

For the Wilderness program, GAOA funding will provide continued support for the Wilderness Ranger program and deferred maintenance activities they perform within the BMWC. Their work will include deferred maintenance tasks such as trail work, invasive weed treatments, and

Wilderness site repair and rehabilitation. The Ranger duo will be fully utilizing our new tablet app for tracking campsite impacts and solitude monitoring, as well as the updated protocol that will bring our LAC monitoring in line with national minimum protocols for solitude monitoring.



Waiting for the rain to pass to spray weeds on the CDT

Lastly, another exciting GAOA funded initiative that will begin this season is redoing the water system at our main Wilderness trailhead, Indian Meadows. The engineering and design phase of the project will begin this summer as we look to produce a more reliable source of water for the outfitter corrals and the public trailhead. Once design is complete, the project will be put out to bid for a contract to complete the construction of the project in the summer of 2022. The current system is inadequate for many of the corrals and the trailhead. A better well and cistern will allow for a more reliable source of water for the all the thirsty critters that come out of the Wilderness during those sweltering July and August days.

South Fork Flathead River Bull Trout Fishery

By Leo Rosenthal, Fisheries Biologist – *MT Fish, Wildlife & Parks*

The Bob Marshall Wilderness is home to one of the strongest populations of bull trout, a species listed as threatened under the Endangered Species Act (ESA). While many other bull trout populations throughout the western United States have declined in recent history, the bull trout population in Hungry Horse Reservoir and the interconnected South Fork Flathead River continues to thrive. Bull trout were listed under the ESA in 1998, and at the time only Swan Lake remained open to bull trout angling because of high population numbers. However, in 2004 Montana Fish, Wildlife & Parks (FWP) was able to reopen bull trout fishing in Hungry Horse Reservoir and the South Fork Flathead under a permit from the U.S. Fish and Wildlife Service. This permit requires FWP to implement the catch card and survey system, closely monitor the bull trout population, and produce semi-annual reports on the status of the bull trout population. This permit provides anglers a catch and release fishery in the South Fork and allows anglers to harvest two bull trout annually from Hungry Horse Reservoir after obtaining a valid catch card. The opportunity to pursue these large fish in a remote wilderness setting is truly a priceless experience.



Bull trout redd in Gordon Creek, October 2019

Adult bull trout numbers are monitored by counting redds (depressions left in the stream after bull trout have spawned) in direct tributaries to Hungry Horse Reservoir, as well as in wilderness tributaries to the South Fork Flathead River. Because of the time and effort necessary to conduct the backcountry counts, these surveys are conducted every 3-5 years.

(Continued on next page...)

Bull Trout Fishery, continued...

Wilderness redd counts were last completed in 2019. Two crews of fisheries personnel covered many miles by trail and stream to complete the survey in early October 2019. FWP fisheries staff counted all available spawning habitat in the Youngs, Gordon, White River, and Little Salmon drainages. Annual redd counts in reservoir tributaries were also conducted. In addition to surveying the Hungry Horse/South Fork bull trout, a crew also surveyed Big Salmon Creek to monitor the Big Salmon Lake bull trout population (fishing for bull trout is not allowed in Big Salmon Lake). The 2019 redd counts for most South Fork tributaries were within the range typically observed, but counts were below average for the Big Salmon Lake population. The trend of redd numbers is stable, which is good news and suggests that the recreational fishery is sustainable.



The South Fork Flathead River during fall bull trout redd counts, October 2019

Similar to just about every other outdoor experience in Northwest Montana, the popularity of river recreation is on the rise. FWP has seen an increase in angling pressure in all three forks of the Flathead River. The South Fork is no exception, and even remote parts of the Bob Marshall Wilderness are seeing an increase in the number of anglers seeking solitude and unique angling opportunities. The bull trout fishery in the South Fork is a great example of this. Angler participation in the bull trout fishery has increased every year since 2004. While most of the bull trout fishing was traditionally done in Hungry Horse Reservoir, recent surveys have shown a greater emphasis on the catch and release fishery in the South Fork. This increase in effort in the South Fork has resulted in more bull trout being caught and released than in previous years. Estimated bull trout harvest from Hungry Horse Reservoir is typically less than 100 fish, but an estimated 723 bull trout were caught and released from the South Fork Flathead River in 2018 (the most recently reported data). These results are concerning, as recent literature suggests that post-release mortality can be high

(Continued on page 14...)

Wilderness or Wilder-less?

By Ellie Fitzpatrick, Ian Bardwell, & Kibb Mills -- *Rocky Mountain RD*

No doubt we have been experiencing the effects of a growing population and the rise of outdoor recreation on our National Forests. As of late, these effects have been amplified by a global pandemic, and the socially distant way we have been encouraged to conduct ourselves. As a result, the human impacts we are seeing on the land have also increased, which leads us to the question: is this Wilderness or Wilder-less?



RMRD spent a few days in 2020 analyzing vegetation cover along transects such as the one pictured. We will continue to gather data related to human impacts in the subalpine campsites along the Chinese Wall in 2021.

In order to balance opportunities for unconfined recreation and solitude with the need to facilitate resource protection and avoid a 'wilder-less' environment, the Rocky Mountain Ranger District is implementing several strategies to manage increased use specifically within the heavily impacted areas surrounding the Chinese Wall. We will be collecting baseline data for existing plant communities in campsites along the base of the Wall in order to track impacts to the vegetation of these fragile environments in the coming years. In order to mitigate resource damage seen in campsites and along our most frequented travel routes, our increased education efforts will also take center stage, with an emphasis on Leave No Trace camping and traveling tactics for groups using horses and mules. Our hope is that an increased presence in well-traveled areas during the height of summer visitor use will also solicit interactions with the public, outfitters and partner

groups; if you see us out there, come say hi, ask questions and/or share information. And, of course, access is of utmost priority; along with our regular trail-clearing endeavors, we will be doubling down on opening our secondary routes and trails to better facilitate travel and opportunities for solitude.

(Continued on next page...)

Wilderness or Wilder-less? continued...

As is well known, the Bob Marshall Wilderness Complex embodies a well-loved and increasingly popular place that has a large array of unconfined recreation and solitude opportunities...and all the challenges that come with it. We are committed to maintaining and improving these opportunities on the Rocky Mountain Ranger District as land managers, but also as recreationists ourselves. So, as you are out for a week or two in the coming months, enjoying a sunset, fishing the North Fork of the Sun, or traveling your favorite trail, maybe give a thought to what you will do, in your own recreation endeavors, to avoid 'wilder-lessness.'



A couple of fun-loving individuals after a day of work in the backcountry, September 2020.

Bull Trout Fishery, continued...

(Continued from page 12...)

...for large bull trout. This increase in bull trout catch further emphasizes the importance of handling fish properly and is one of the reasons FWP made a regulation change in 2020 banning the use of treble hooks in the river system. The single-pointed hook regulation for the South Fork is a proactive approach to make it easier for anglers to release their fish unharmed. The bull trout populations will continue to be monitored in subsequent years to detect any trends related to overall numbers and any potential impacts of the recreational fishery. In the meantime, anglers can do their part to help protect this fishery by landing fish quickly and safely, keeping them in the water while releasing and taking any photos, consider pinching down the barbs of flies/lures, and limiting the number of fish they catch.

Spotted Bear Wildland Fire Module

By Nate Harrison, *SBRD Wildland Fire Module Leader*

Spotted Bear Ranger District's fire crew, which has historically been an engine module, started making the transition last year to a Wildland Fire Module (WFM). WFMs were originally known as Fire Use Modules and conceptually developed by the Park Service in the 1990s. The primary purpose of these modules was managing, rather than suppressing, fires to reduce costs and assist park units with resource benefit fires, prescribed fires, and fuels reduction projects. A module's mission is to provide an innovative, safe, highly mobile, logistically independent, and versatile resource with a commitment to maintaining fire's role as a natural ecological process within wildland fire management and incident operations. This concept fits right in with the Spotted Bear Ranger District's responsibility of managing a vast amount of Wilderness. Last season, the Spotted Bear WFM went through the preliminary assignments required to attain WFM status, which include shadow



A pack string provides resupply to the WFM within the Wilderness.



Mud Lake Lookout is wrapped during the Garnet Fire of 2020

assignments of certified WFMs. In October, the module completed a shadow assignment with the Unawep WFM on the Middle Fork Fire on the Route National Forest in Colorado. (See photos on the next page.) The Spotted Bear WFM will go through the certification process this spring. This will also be the first season in several years that the Spotted Bear Ranger District's fire program will be fully staffed.

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Wildland Fire Module continued...

Unmanned Aerial Systems (UAS)

The Spotted Bear WFM also has Unmanned Aerial Systems (UAS) capabilities for utilization on fires or projects. This is currently limited to aerial observation (pictures and video) and some mapping capability. UAS technology has proven to be extremely useful in planning and for situational awareness on the fireline. The Forest Service is fairly new to the UAS world, but the program is growing rapidly, as are its capabilities, which include PSD (Plastic Sphere Dispenser) -- used for ignition operations on prescribed fires or wildfires -- and potentially LIDAR (Light Detection and Ranging) or other remote sensors.



The Middle Fork Fire on the Route NF in Colorado, October 2020



The Middle Fork Fire on the Route NF in Colorado, October 2020

If you would like more information, you can contact the Spotted Bear WFM module leader, Nate Harrison, at nathan.harrison@usda.gov



Bighorn Sheep and Mule Deer Research Project Updates

By Brent Lonner, *MT Fish, Wildlife & Parks*

Beginning in 2015 (bighorn sheep) and 2017 (mule deer), two larger scale research projects were implemented in specific study locations in Montana to include the Southern Rocky Mountain Front (RMF) area. The overarching goals and objectives for these research efforts stemmed around improving our understanding of specific ecological perspectives at both local and statewide levels for each species.

More specifically and for bighorn sheep, this project was titled, "The role of disease, habitat, individual condition, and herd attributes on bighorn sheep recruitment and population dynamics in Montana". This was a significant collaborative effort between Montana State University (Bozeman) faculty and students and MT Fish, Wildlife & Parks (FWP) staff. Study areas were located throughout Montana and primary objectives included 1) capture, sampling, and instrumentation of animals in all study populations, 2) Assessing respiratory pathogen communities and associations with demographic performance, 3) Analyzing GPS collar data to predict bighorn sheep habitat and evaluate movement strategies, 4) Collecting data to estimate demographic rates of each herd included in the statewide study, and 5) Collecting and providing samples for a bighorn sheep genetics study and complete preliminary genomic analyses. Although all capture work was completed outside wilderness areas along the RMF study area, heavy use of wilderness areas by bighorn sheep was documented. Bighorn sheep use of wilderness habitats along the RMF was found year-round and demonstrates the value of managing habitats depending on species needs throughout the course of the year.



GPS radio collar retrieval in the upper Biggs Creek area, Bob Marshall Wilderness, view looking north. (Collar located in the lower right corner of the photo.)

(Continued on next page...)

Bighorn Sheep and Mule Deer, continued...

The mule deer project was smaller in scale and for at least the pertinent involved study areas, focused more along the southern RMF and Northwest Montana areas. This project was titled "Integrating statewide research and monitoring data for mule deer in Montana." This project was a collaborative effort between University of Montana (Missoula) faculty and students and FWP staff. Primary objectives included 1) investigating integrated population modeling at both regional and statewide levels, 2) Capture, sampling, and instrumentation of animals in the study populations, 3) Completing basic field monitoring of collared adult female mule deer to include vital rate monitoring, space use and migration and diet composition, winter & summer, 4) Assessing mule deer summer habitat selection to include vegetation sampling & forage modeling, risk-forage trade-offs and relationships to landscape disturbance, and 5) Assessing mule deer winter habitat selection. Like the bighorn sheep project, all initial captures were completed outside wilderness boundaries (private and public land), but significant use of wilderness habitats were documented primarily during the summer period, to include important migration perspectives.

A huge thanks to both MSU and UM faculty & staff, FWP employees and the many volunteers for all their help in making these projects happen. Information obtained from these projects is already aiding our ability to understand and better inform management thoughts and decisions for these species. In addition to completion of graduate thesis reports, other final project reports are being finalized for each of these significant efforts.

For further information, especially for the RMF study area (e.g., thesis reports, annual reports, project details, etc.), contact:
Brent Lonner {blonner@mt.gov / (406) 467-2488}.

GPS radio collared mule deer doe
(with fawn) along the Southern
Rocky Mountain Front.





An Interagency Field Trip to the South Fork

By Jim Flint -- *FMO, Spotted Bear Ranger District*

Last summer, new Forest Supervisor Kurt Steele joined DNRC Area Managers Greg Poncin (Northwest Land Office) and Hoyt Richards (Central Land Office) on a field trip into the South Fork of the Flathead. A few hangers-on (including the author of this article) traveled along with them to keep them out of trouble, so to speak. The focus of the trip was Wilderness fire management and Wild and Scenic River recreation, but the discussions were wide ranging from prescribed burning to recreational aviation to timber production to fish habitat to historic preservation. It was an opportunity for the BMWC managers to showcase the Complex (or at least a small portion of it) to both Kurt and our DNRC partners.



A stopover at Black Bear Cabin. (From left to right: River Ranger Gangemi, Poncin, Steele, Pence, Richards, and River Ranger Stansberry.)



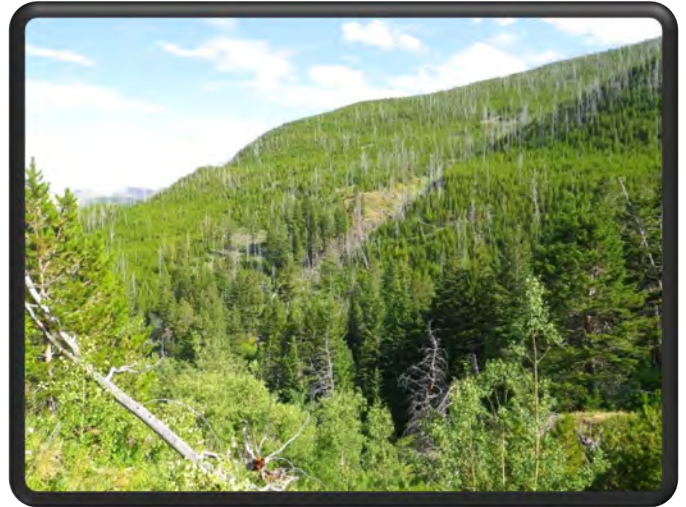
Greg & Hoyt show Kurt how to “get the cut out” at the Big Prairie firewood pile.

In addition, the ability to establish common understanding of the landscape both in the physical and social political sense is enormously valuable as we work through the challenges posed by predictably unpredictable fire seasons and changing demands for public land uses. During the trip, which was described variously as leisurely and grueling, time was taken for citizen science (read here “hook and line fisheries sampling”) and serious forestry (we measured a contender for the DNRC statewide “Big Tree” book). Kurt was able to meet some of the Wilderness-based crews (in a physically distanced sort of way) and Greg was able to see where his father worked when he staffed Jumbo Lookout. It only rained four out of six days.

Elk-Smith Project Decision Signed

By Russ Owen, *Rocky Mountain Ranger District*

Thirty years and running, local newspapers to the east and south of the Bob Marshall Wilderness Complex still mark anniversaries of the Canyon Creek Fire of 1988, as papers in other parts of the country and world might mark a catastrophic earthquake, tsunami, hurricane, or the decisive battle that ended a protracted war. There are numerous reasons for this devotion to the memory of a single wildfire. Certainly, the Canyon Creek fire stands out even when looking back on a year that was legendary for large fires. With a Jetstream surfacing on the fire the evening of September 6, 1988, the fire's perimeter swelled by over 280 square miles in a single night. Snow soon followed, but the fire had already wrought significant damage to local communities, ranches, outfitting operations, and injured several firefighters.



Regeneration and persistent conifers in the 1988 Canyon Fire perimeter, found within the Elk Smith Project Area. Photo credit: Tanya Murphy.

The fire killed over two hundred and fifty cattle, burned two hundred miles of fencing, millions of board feet of timber, private and public livestock pasture and two thousand tons of hay; and destroyed numerous cabins and outbuildings. It resulted in two separate fire shelter deployments, with nine firefighter suffering severe burns. To those who witnessed the fire's terrifying final run, the fact that no one was killed seemed bewildering, almost inexplicable. Though numerous large wildfires have burned in--and on the perimeter--of the Bob Marshall Complex in the past 33 years, no fire has equaled the Canyon Creek Fire's impact on the public imagination.

On January 26 of this year, Rocky Mountain District Ranger Mike Muñoz signed a Decision Notice for the Elk Smith Project. The Decision documented Ranger Muñoz's selection of the Action Alternative to reduce fuels on 10,329 acres in the Elk and Smith Creek drainages. The Project is located on the southern reaches of the Rocky Mountain Ranger District and runs from Crown and Steamboat Mountains on the west to foothills on the east. It is located almost entirely within the perimeter of the Canyon Creek Fire.

(Continued on next page...)

Elk-Smith Project Decision continued...



*Red Shale Fire reburn (2013) within
Gates Park Fire (1988) perimeter.
Photo credit: USFS*

The method of reducing fuels in the project area will be primarily through broadcast burning, utilizing aerial and hand ignition. It is hoped that the results of treatments on the landscape will mimic the natural pattern of reburn that has occurred throughout the Bob Marshall Complex in the last two decades. Modelling of the proposed treatments in the project was based on weather and fuel conditions recorded during the Red Shale Fire of 2013. This fire burned within the perimeter of another large fire occurring in 1988, the Gates Park Fire.

Besides the experience and observations of fire managers, development of the Elk Smith project benefitted from recent studies of reburn and fire ecology in the Bob Marshall

Complex conducted by researchers such as Casey Teske, Cameron Naficy, and Sean Parks. For example, Sean Parks' work indicates that natural reburn can reduce the size, occurrence, and severity of subsequent fires and is vital to maintaining ecosystem heterogeneity. Due to its proximity to homes, private ranch lands, roads, and trailheads it is unlikely that managers will be able to allow wildfire to play fully its natural role in the Project Area. However, managers feel that wildfires occurring in the Project Area following treatment may be managed more successfully, with a wider range of strategies and tactics, than if the landscape were untreated. For example, indirect strategies to control fire spread may be considered, rather than defaulting to immediate attempts of full suppression regarding new fires. In addition, managers will be more likely to allow wildfires to occur and spread naturally in the Scapegoat Wilderness to the west of the Project Area, following the implementation of these treatments. Finally, treatments will help managers reduce the risk wildfire poses to the health, safety, and livelihoods of people who recreate and work in the shadow of the Canyon Creek Fire.

The Bob Marshall Wilderness Foundation's Commitment to Diversity, Equity and Inclusion

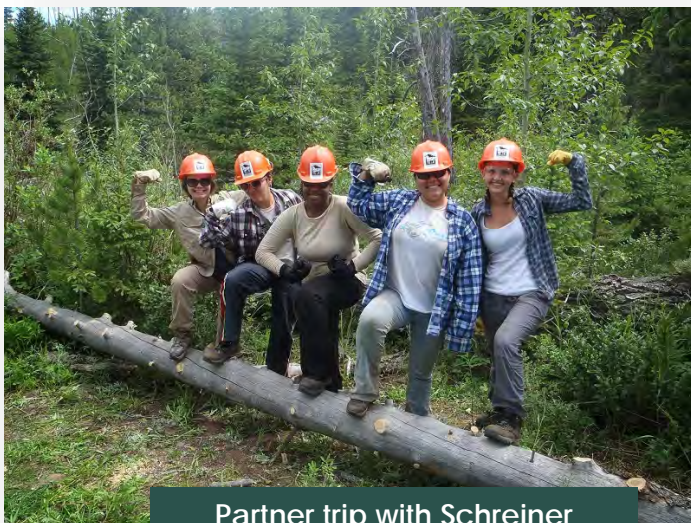
By Bill Hodge, *Executive Director*

Bob Marshall was best known as a passionate advocate for the protection of wilderness, but he was also a champion for the social justice issues of his day. Bob fought for the integration of Forest Service facilities and equal access to public lands in the 1930s. He was a tireless campaigner for the rights of workers as well. Bob fought for programs that would create tangible connections to wild nature for all Americans.

As an organization who bears his name, the Bob Marshall Wilderness Foundation aims to follow in Bob's footsteps. As a committed group of public land stewards, we also stand with those that demand an American experience that is equitable, fair and just.

No matter how deep we feel our own connections to this place, now referred to as the Bob Marshall Wilderness Complex, we will never know it as the endless generations of the Salish, Kootenai and Blackfoot people did – those that simply knew these northern Rockies as home prior to the arrival of Europeans on the continent. Recognizing this overdue need to place the Bob Marshall Wilderness Complex, and the wilderness idea, in the proper context is the start of our journey. The Bob, and the National Forests on which it lays are part of a fabric of public lands established on the soil of native peoples, lands that were not free of humans, but rather lands that did retain their primeval character through the stewardship of those that lived on them.

With their complicated and often dark history in mind, we are committed to exploring all perspectives on our public commons. We are educating ourselves on the true history of the formation of our public lands, including the violent forced removal of tribal communities and the exclusion of people of color, in order to better understand how the past informs the future for the wilderness experience that is promised in the Wilderness Act.



Partner trip with Schreiner University in 2013

Through intentional actions we will seek connections with nature for all Montanans and Americans – connections that come from time spent on the lands we all share. We will work to remove barriers for those that have not seen themselves as part of the American public lands story, including Black, Indigenous, People of Color and LGBTQ+ communities. We will explore our own actions, examine our own policies, and facilitate partnerships to help remove the vestiges of exclusion.

(Continued on next page...)

Diversity, Equity and Inclusion, continued...

Specific actions that we will build upon in 2021 include:

- A clear zero-tolerance policy for harassment or discrimination in any form, in any aspect of our work, including volunteer trips, internships, online and in-person outreach, and our office environment. This policy is expressed and outlined on our website, in our online volunteer registration form and at the trailhead before each project.
- Giving recognition to the native lands we are occupying at any time the BMWF is in front of the public. This includes our fundraising events, website and social media, and at the beginning of each volunteer project.
- Listening to, learning from, and partnering with BIPOC and LGBTQ+ groups such as Outdoor Afro, Greening Youth Foundation, and Glacier Queer Alliance, and working to amplify their voices in the Wilderness Community through our own channels.



2020 Wilderness Conservation Corps (WCC) crew



Sleeping bag donations from Glacier Outfitters for the BMWF Gear Library

(Continued on next page...)

- Building a Gear Library to loan quality outdoor gear to anyone who wants to participate on our volunteer projects, to ensure everyone has access to a comfortable and safe wilderness experience. More details coming soon.
- Partnering with Greening Youth Foundation to hire young adults from diverse backgrounds for our Wilderness Internship positions.
- Hosting affinity group Wilderness Experience trips teaching outdoor skills in a community-centered space to empower more confident wilderness users. More details coming soon.
- Engaging in a comprehensive justice, equity, diversity and inclusion (JEDI) training program for our staff and board members and building a holistic JEDI Plan for the organization.

Diversity, Equity and Inclusion, continued...

As an organization we have made a commitment to filling our community, our board and our staff with new voices, wide-ranging ideas and a wealth of different perspectives. We pledge to build meaningful relationships not only with our passionate volunteers, donors and supporters – but with those individuals and organizations that do the incredible work of connecting a new and more diverse generation to wild nature.



Partner trip with Salish Kootenai College Upward Bound in 2015

This article was written on the ancestral lands of the Salish-Kootenai people.

If you would like to know more about the history of lands you live and work on, check out this unique [map](https://native-land.ca/) at <https://native-land.ca/>

**CONNECTING
PEOPLE
WITH
WILD PLACES**

The **Bob Marshall Wilderness Foundation** works to connect all Americans with their wilderness heritage by providing access to and stewardship of one of the world's most spectacular places. Help us give back to The Bob and inspire the next generation of conservation leaders.

Donate • Volunteer • Events • Gear Library • #lovethebob » [BMWf.ORG](https://www.bmwf.org)



2021 Update from the Seeley Lake Ranger District:

By Jeremy Watkins, *Seeley Lake Ranger District*

Hello Bob Marshall Wilderness Complex community, greetings from the Seeley Lake Ranger District!

It will come as no surprise that 2020 threw a few challenges our way, forcing us to change the way we operated in order to keep our employees, partners, and visitors healthy and safe (all while seeing a record number of visitors in the back country and front country). Some of those measures included “modularizing” our different crews and limiting the number of personnel in housing and vehicles. The most obvious changes for the public were physically closing our doors and cancelling our different volunteer and partner projects. While we will continue using many of these measures, we are hopeful that with proper precautions, we will be able to start hosting volunteer and partner projects for 2021.

Last summer saw us with a trail crew of four, one seasonal packer, and a Wilderness Ranger Intern from the Bob Marshall Wilderness Foundation (BMWf). 2020 was also the second season that we partnered with the BMWf to supply a paid “Pro Crew” for the District, which accounted for three of the four trail crew positions. While this partnership worked well and a lot of good work was accomplished, all things must pass, and the funds for this agreement have been exhausted. We would like to thank the



A beautiful view of Scapegoat Mountain

BMWf for being willing to try something outside of their normal scope of business, as well as thank some of our other friends and partners for going to bat for that funding in Washington DC. Those crews were funded with CMFD Disaster Relief funds stemming from the 2017 Rice Ridge Fire. While we did receive and utilize BAER Funds (post fire rehabilitation funds) in 2018, the extent of the damage to our trail system was much larger than one year of additional funding could cover.

Aside from our normal annual and deferred maintenance, we had a few other highlights from the 2020 season. The Smoke’s Cabin Pack Bridge on the North Fork of the Blackfoot (Hobnail Tom Trail #32)

(Continued on next page...)

Seeley Lake Ranger District, continued. . .

was completed on schedule, following the North Fork Cabin Bridge in 2019. While we will miss the old, iconic native material bridges, the new bridges will allow for years of continued access while restoring a more natural streamflow to those sites.

The second accomplishment we would like to mention is the completion of the bridge and culvert work on the Dunham Creek Road #4388. This road was closed for the majority of the 2020 season and severely limited access to the Lodgepole Creek Trail #13. Having this road and trailhead open again will help alleviate the extra pressure on our other major trailheads leading into the BMWC.



New bridge on the W. Fork of Spruce Creek (Dunham Creek Rd. 4388), completed in 2020

Speaking of the Monture Creek Trail #27, we have been having major problems keeping the crossing of Yellowjacket Creek passable and safe for stock use (as was mentioned in the 2020 newsletter). The same September 2019 storm which caused washout issues on the Dunham Creek Road also caused a major washout at this site, making it impassable to stock. With the use of explosives, we were able to repair it, however the spring runoff again washed away more material and tread. While it was repaired and passable in 2020, the narrowing of the trail has caused some stock to spook away from the waterfall, with the result being wrecks. At this time, we would not recommend taking long pack strings through here (particularly during high water). We are looking at a long-term solution of a re-route farther down the slope. (See the next page for a series of photos.) Another issue with this route is the 2020 avalanche debris which is still blocking the Hahn Creek #125 trail, just on the other side of Hahn Pass on the Spotted Bear Ranger District.



The new North Fork Cabin bridge was completed in 2019

The third highlight was some much-needed administrative site work at Burnt Cabin (Monture Creek Trail #27). Our crew rebuilt the corrals, as well as reduced the fuels around the cabin, making it more prepared for wildfires.

Seeley Lake Ranger District, continued. . .

The Yellowjacket Creek saga, in a series of photos:

2018 pre-blasting



2018 post-blasting



2019 pre-blasting



2019 post-blasting



So, what will the 2021 season have on hand for the Seeley Lake Ranger District? We are currently looking at a trail crew of six seasonal employees, one seasonal packer, as well as two Wilderness Rangers. One of these positions is funded through the Great American Outdoors Act (GAOA). As mentioned before, we hope to resume our normal volunteer and partner group projects which include: BMWF volunteer and Wilderness Conservation Corps (WCC), Back Country Horsemen, Montana Wilderness Association, and three hitches of a Montana Conservation Corps (MCC) crew. Our annual maintenance log out may prove to be more difficult than normal this summer, due to a major windstorm we experienced in January. That, along with historic avalanche conditions and an unpredictable spring runoff, *could* lead to some difficult early conditions on the trails.

As some may remember from our 2018 update, we did a major maintenance project on the Carmichael Cabin in 2017. This year, we are finally going to be able to finish that project with plans to replace the roof, oil the logs, and repair some of the daubing. As in 2017, we will be fortunate to have assistance from outside our Forest and District in the form of the Northern Region Pack String and possibly personnel from the Rocky Mountain Ranger District and Helena-Lewis and Clark NF. This project was rescheduled from 2020.

Well, that pretty much catches folks up on what we have going on here. As always, we encourage people to call us with any questions, inquiries about current conditions, AND information regarding conditions that we may not be aware of. We hope you all have a great spring and maybe we'll see you out on the trail...

Instructions Stamped in Tin

By Guy Zoellner, *Spotted Bear Ranger District*

History is fraught with educational opportunity, as often is the case for Wilderness work. Several years back, the Montana Pilots Association came to us with a proposal to work on the Schafer Meadows airstrip. Institutional knowledge of how, and even what to do, had left the agency decades ago. Luckily for us, the instruction manual was stamped in tin and nailed to the wall, and the implement itself was parked outside the front door.

Schafer Meadows is one of two backcountry work centers for the Spotted Bear Ranger District. Forest Service trail crews live at and work out of the Schafer Meadows Ranger Station for the entirety of the season. A unique fact of the station is that there is also a public airstrip adjacent to the compound. The history of the landing strip is somewhat tumultuous, but after being embattled over for decades by pilots and Wilderness purists alike, it finally found concession as the only active airstrip within the Bob Marshall Wilderness Complex boundaries. With flight numbers up to 10 or more each day from June through September it can be a bustling hub of activity.

In the winter of 2016, the Pilots Association approached us about some deferred maintenance that was needed on the airstrip. This maintenance was to include grading and rolling the runway to make a safer landing surface for the planes. We partnered up and began the process of learning how to accomplish this task.

The first measure of business was to assess what we had. Fred Flint, Forest Service retiree and longtime volunteer, made a visit to the boneyard of equipment in the front yard of Schafer Meadows. Here he found a roller, mower and grader. All horse drawn. The mower was quickly deemed unusable but the other two implements were still in relatively good shape. When Fred pulled apart the gear box on the grader, he found oil still in it!

Now that Fred was off counting bolts and fabricating parts in his shop at home, the Pilots Association and the Forest Service got together and worked on the front end of the maintenance equipment, the equine engines. Through a cost share agreement with the Pilots, the Forest Service was able to purchase a team of young mules, a new harness, and cover the cost of time for the teamster.



Coconut and Bonnie pull the Adams Leaning Wheel Grader, with Colin Milone and Guy Zoellner as operators

(Continued on next page...)

Instructions Stamped in Tin, continued...

Fast forward to the Fall of 2019: We purchased a set of Belgian mules with plans to start training them in the winter and to head to Schafer that spring. The COVID-related shutdowns proved to be the perfect time to spend working the mules and laying the groundwork for a successful operation. We spent a month harnessing the mules daily, dragging tires, skidding logs, ground driving and then finally harrowing the pastures. All good work, but the biggest task was putting in the time to desensitize them to the clanging and banging the grader was going to make. All of our energy at this point was put towards creating an environment for the mules where they could learn how to handle the noise and sensations that the grader was going to dole out once we went live on the airstrip. As with all things in horsemanship, preparation is near the top. The risk of a dangerous runaway made it necessary to give the mules significant time to practice the work and to feel safe pulling the grader.



*Aerial view of the Schafer Meadows airstrip, facing south.
Photo credit: Scott Newpower*

At the end of August 2020, we closed the airstrip for seven days and buckled down. Jim Flint, SBRD Fire Management Officer, had replicated a box grader from some old Forest Service plans. Fred Flint had oiled everything, replaced bolts and generally overhauled the old Adams Leaning Wheel Grader at Schafer. Schafer Meadows supervisor Jeremy Rust, along with volunteer Colin Milone and I brought in all the livestock. We harnessed the old team first and hooked them onto the road grader to see if it would even roll. With ease, they pulled it out of five decades worth of sod and parked it on the east end of the airstrip, ready for work.

Jim's box grader, as it had teeth to rip the sod. Then the Adams grader was able to bust the top of the bumps off and start leveling things out. And after that it was simply time and mileage. The mules would work in teams of three, at approximately 1000 feet each day.

The intent of all parties throughout the process was to maintain the airstrip but disturb as little as possible along the way. With a 3,500-foot-long runway to work, there was ample opportunity to leave a wide mark. Rewind to the educational component of history: The Adams Leaning Wheel Grader was a popular implement in the 30's. While archaically simple

(Continued on next page...)

Instructions Stamped in Tin, continued...

on first appearance, the tool was well-designed to have incredible finesse. Armed with the ability to only grab the high spots and preserve the rest, we were able to leave the vast majority of the sod intact. Combine this with hundreds of pounds of native seed we brought in and a prioritization on the weeds spraying list, and we felt good about the minimal disturbance with maximum benefit.

In the end, we were able to put in a runway parallel to the existing one. This gives the pilots the opportunity to alternate airstrip use every year, giving the grass a chance to grow, keeping the bumps down and thus keeping the landing smoother. Without the combined efforts of a bunch of folks and several generations, this would have continued to be an under-maintained airstrip. We've agreed to work annually on the strip and, more importantly, to pass these skills on --- in better form than stamped tin on an office wall.

Finally, I must say that none of this would have happened without the mules: Coconut, Bonnie, Belle, and Bull. They did it all. They dragged the implements every single inch of the runway. They bore the sweat, wore the collars and dealt with the dust. All without complaint or any mishap. It's a beautiful thing to watch critters like this find pride in a job and prove that preparation and teamwork makes for a safe, productive, and an efficient job well done.



Bonnie, Bull and Coconut wait patiently at the hitch rail near the Schafer airstrip

If you'd like to see some videos of this project in action, check out the following links on YouTube. The first link is a short demonstration of the Adams Leaning Wheel Grader in action, video by FS employees and posted by pilot Scott Newpower. The second link is a longer photo/video combination describing the entire process, narrated by volunteer Fred Flint and posted by the Bob Marshall Wilderness Foundation.

USFS Schafer Runway Work 2020: <https://www.youtube.com/watch?v=EseDvO2fay0>

Schafer Meadows Airstrip Project 2020:
<https://www.youtube.com/watch?v=fVNax1XmC4c>



Warm and Dry Year Snowpack Accumulation in the Bob Marshall Wilderness Complex

By Len Broberg, *Professor of Environmental Studies
at the University of Montana*

How will warmer and/or drier winters affect snowpack and water supplies? What role can headwater regions, like the Bob Marshall Wilderness Complex, play in buffering us from the effects of our changing winters? Climate change is predicted to take us into uncharted climatic territory. It is a major question how society, and land management specifically, can respond to minimize impacts. To make our best judgments, we need information about what parts of the landscape are most vulnerable and what parts are most resistant to change. A recent study by the University of Montana Environmental Studies Program, supported by the Crown Managers Partnership, begins to provide some answers. Dr. Len Broberg, with the assistance of the Miistakis Institute, investigated the response of watersheds in the Crown of the Continent, including the Bob Marshall Wilderness Complex, to warmer and drier conditions in the period 1980-2013. By examining past responses to conditions that might negatively impact snowpack and water resource availability, we can get some clues about what the future might hold and where we should act most carefully.

Many studies have documented declines in winter snow accumulation across western North America. Many of these studies use SNOTEL station data, sites that collect daily temperature, precipitation, snow depth and the water content of snow. The location of these sampling sites is generally in a narrow range of altitudes. The sites are not located in protected, very remote or very high elevation areas. There are none located in the Bob Marshall Wilderness, for instance. The number of these sites is also limited -- they are not located in every watershed. In addition, studies using climate models have predicted decreasing snowpack for the region in the future. These models are very useful for making estimates of future impacts, but always have some attendant uncertainty. It is also challenging to generate information at the watershed scale in order to distinguish local differences in response to estimated changes in climate. Few studies have looked at snowpack response across the US-Canada border or at a Crown of the Continent scale.

Despite the headwater location of the Bob Marshall Wilderness Complex straddling the Continental Divide, watersheds substantially encompassed by the Wilderness have suffered declines in snowpack water content in recent years, as well (*see Figure 1 on next page*). Thus, even protected areas are subject to the influence of climate change, and high elevation is not completely insulating the Continental Divide from its effects. As a result, it is critical that we use the tools available to understand the important factors

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Snowpack Accumulation, continued...

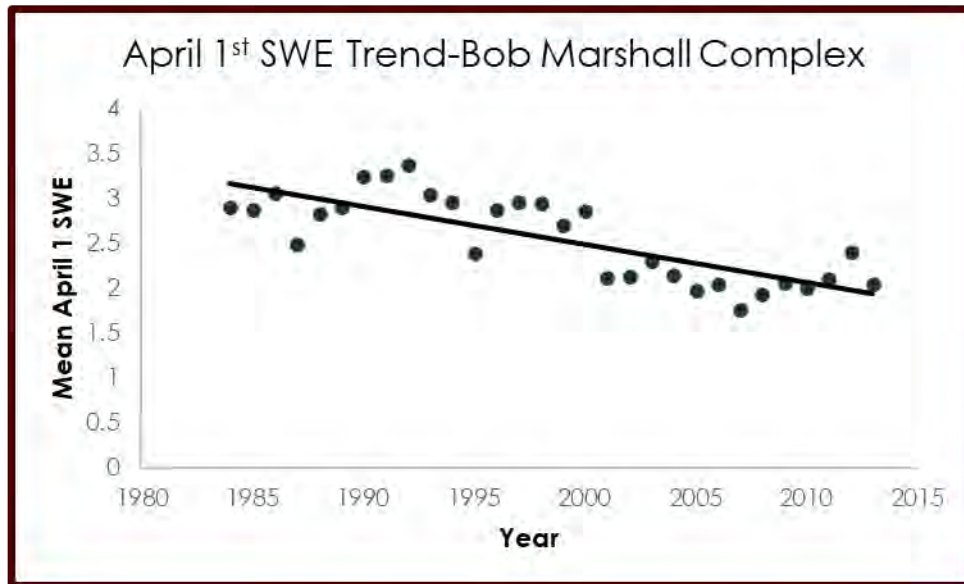


Figure 1. April 1st SWE trend in watersheds substantially in the Bob Marshall Wilderness Complex. Points represent the 5-year running average of April 1st snow water equivalent (SWE) derived from the Daymet 2.0 dataset.

driving these changes and to evaluate whether there are some places that are more resistant to change than others. Without such information, we risk making uninformed choices that diminish limited resources ineffectively.

Using a Geographic Information System (GIS) based dataset known as Daymet, Broberg investigated how much snow water equivalent (SWE) was held in the 11 warmest/driest winters, compared to the cooler/wetter winters in individual watersheds across the Crown of the Continent. Snow water equivalent is a measure of how much water is held in the snowpack. Higher SWE means more water held for release through snowmelt, the major process feeding streams throughout the rest of the year. The study also examined the retention of water held in the snowpack from April 1st to June 1st. While traditionally SWE peaks on April 1st in western North America, peak runoff occurs in late May to early June in snowmelt-dominated river systems, and the persistence of water later into the spring can indicate the potential for sustaining flows later into the summer/fall dry period.

At the full Crown of the Continent scale, the study showed that both precipitation and temperature played a significant role in shaping the SWE accumulated in snowpack by April 1st in the period. Precipitation was the stronger influence of those two determining factors.

(Continued on next page...)

Snowpack Accumulation, continued...

At the individual watershed scale, elevation, precipitation and temperature all contributed to snowpack accumulation, in that order of importance. Watersheds with higher average elevation, higher average daily precipitation January - March, and lower average temperature held more SWE on April 1st relative to other watersheds in unfavorable conditions (**Table 1**).

Metric	Month	Type	Median Top	Median Mid
T _{max} (°C)	Feb	Warm	2.408	4.469
T _{avg} (°C)	Feb	Warm	-0.489	0.866
Total Precipitation (mm/day)	Jan, Feb, March	Dry	55.87	45.96
Elevation (m)	-	Warm Dry	1768.9 1774.4	1543.5 1612.1

Table 1. Temperature, precipitation and elevation differences in warm or dry years. Results shown for the top 30 watersheds and the middle 30 watersheds ranked by warm 11 and dry 11 years mean retention of April 1st SWE.

When the top 25% of watersheds best holding onto their snowpack water content in warm or dry years were ranked, several watersheds substantially within the Bob Marshall Wilderness Complex emerged (**see Figures 2 and 3 on next page**). The South and Middle Fork of the Flathead; the Dry, Landers and North Fork of the Blackfoot; the North and South Forks of the Sun River and the Upper Dearborn all withstood drier winters much better than average. The South Fork of the Sun River, South Fork of the Flathead headwaters and the Dry and North Forks of the Blackfoot all held onto more snowpack than ¾ of the Crown of the Continent watersheds in warmer winters. Thus, the Bob Marshall Wilderness Complex is likely to play an important role in maintaining streamflow in the Upper Missouri, Flathead and Clark Fork River Basins whether the outcome of climate change is warmer winter temperatures and/or drier winters with less precipitation.

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Snowpack Accumulation, continued...

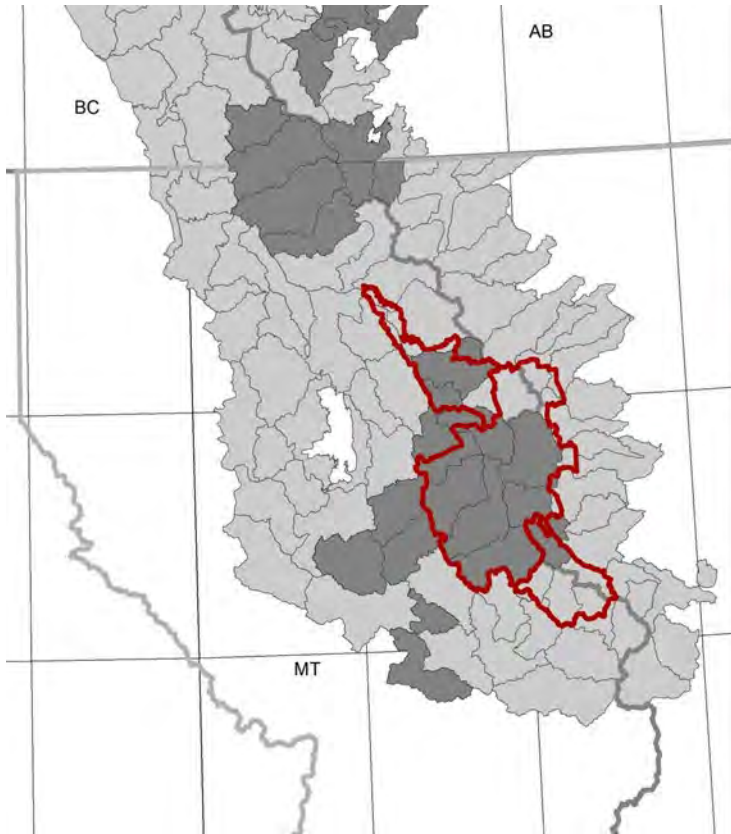
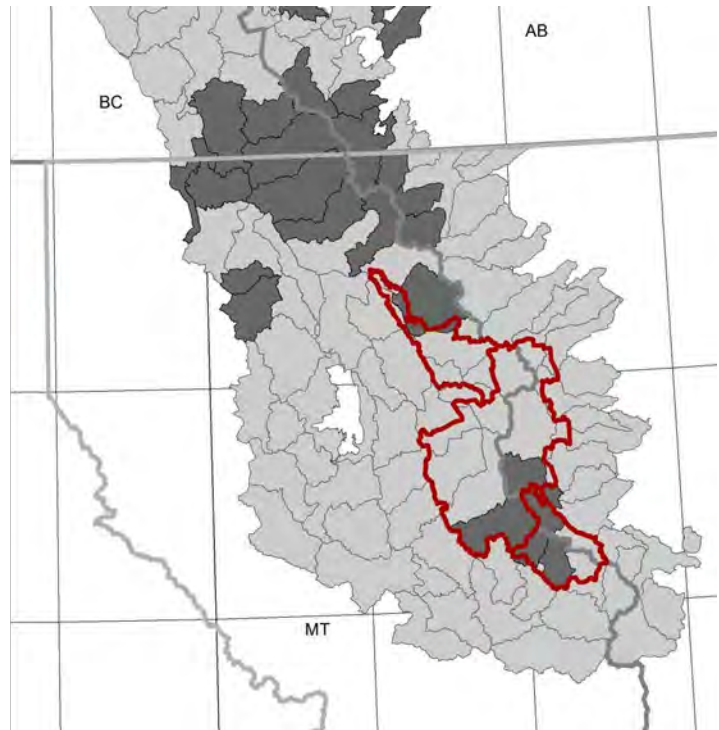


Fig 2. High snowpack retention watersheds in dry years in the southern Crown of the Continent. The wilderness units making up the Bob Marshall Wilderness Complex are outlined in red. The top 25% of watersheds by April 1st SWE retention are in dark gray.

Fig 3. High snowpack retention watersheds in warm years in the southern Crown of the Continent. The wilderness units making up the Bob Marshall Wilderness Complex are outlined in red. The top 25% of watersheds by April 1st SWE retention are in dark gray.





Bob Marshall Wilderness Complex

NATIONAL FORESTS

Helena - Lewis and Clark NF

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Deputy Forest Supervisor:
Sara Mayben

Flathead NF

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Forest Supervisor:
Kurt Steele

Lolo NF

Missoula MT
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Forest Supervisor:
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Hungry Horse RD

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Seeley Lake RD

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District Ranger:
Quinn Carver
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Lincoln RD

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District Ranger (vacant)

Spotted Bear RD

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(406) 387-3800 (winter)
District Ranger:
Scott Snelson
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Website

<https://go.usa.gov/xd6pU>



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