USDA APHIS Wildlife Services Nonlethal Initiative for Livestock Protection

FY 2021 Annual Accomplishments Report
January 2022

In FY2021, Wildlife Services (WS) received $1.38M from Congress for the second year in a row to expand the use of nonlethal methods to protect livestock from large carnivore depredation and to research efficacy and development of new nonlethal approaches. WS distributed the funds to select state programs, WS' National Wildlife Research Center (NWRC), and WS' Operational Support Staff (OSS) to meet the intent of the initiative (Table 1). As part of normal practice with all congressional initiatives, a portion of the funding goes to USDA, APHIS, and WS as administrative overhead to provide various administrative services. OSS normally receives a larger amount for travel, however, travel remained restricted throughout the year due to the global COVID-19 pandemic and that level of funding was greatly reduced. That available funding was instead allocated to state programs for mission delivery.

Table 1. Distribution of the $1.38M allocated to WS for nonlethal livestock protection in the FY2021 budget.

	FUNDS RECEIVED
WS State Programs	955,500
WS NWRC	100,000
WS OSS	1,500
USDA, APHIS, and WS Administrative Overhead	323,000
TOTAL	**1,380,000**

FY2021 funding was distributed to the same 12 states that received funding in FY2020 (Arizona, California, Colorado, Idaho, Michigan, Minnesota, Montana, New Mexico, Oregon, Washington, Wisconsin, and Wyoming) with the addition of a 13th state: Nevada (Table 2). The total funding amount stayed the same from FY2020 to FY2021 ($1.38M), but departmental overhead increased, meaning the available funding was a lesser amount in FY2021. FY2020 funding distribution levels and corresponding impacts were evaluated following the fiscal year, and minor adjustments were made to maximize the impact of funding applied in the field in FY2021. For example, distribution of funds in FY2020 considered start-up costs associated with creating new positions (i.e. new vehicle needs, procuring necessary equipment) which were no longer needed in FY2021. Through these analyses and adjustments, WS increased the amount of available funding that went directly into the state programs' mission delivery

by more than $20,000 in FY2021. This funding put range riders in the field; allowed for fladry, fencing and other deterrents to be installed and maintained; and purchased guard dogs and other nonlethal interventions in 13 states where large carnivores threaten livestock.

Table 2. Distribution of operational funds, by state.

	FY20 Actual ($)	FY21 Actual ($)
AZ	100,000	100,000
CA	120,000	105,000
CO	25,000	35,000
ID	50,000	55,000
MI	60,000	60,000
MN	90,000	90,000
MT	150,000	150,000
NM	100,000	100,000
NV	0	3,500
OR	80,000	97,000
WA	10,000	20,000
WI	60,000	60,000
WY	80,000	80,000
Total	925,000	955,500

In FY2021, funding supported 17 full-time employees and more than a dozen part-time staff in 11 states (Table 3). Two additional states (Nevada and Washington) did not require additional personnel. These states used their funding to acquire fladry equipment to use or loan as needed to address wolf depredation.

Table 3. Full-time (FTE) and part-time employees (PTE) working on the Nonlethal Initiative, by state.

	AZ	CA	CO	ID	MI	MN	MT	NM	NV	OR	WA	WI	WY	TOTAL
FTE	1	1	0	3	1	1	4	1	0	2	0	1	2	**17**
PTE	1	6	1	4	0	5	0	0	0	0	0	6	0	**23**

Employees hired under the initiative in FY2021 conducted more than 57 fladry projects, 222 range riding projects, 58 harassment projects, hosted or participated in more than 25 outreach events, built 23 permanent fences, and constructed 74 electric fences (Table 4). In total, the Nonlethal Initiative completed or were in-progress on 682 projects in FY2021. WS staff on the Initiative also provided nonlethal technical assistance 136 times in FY2021. These cumulative work tasks assisted 901 cooperators.

WS NWRC is continuing studies that began when the funding was received in FY2020. This research evaluates the effectiveness of fladry, range riding, and fencing in reducing predation, benefit-cost ratios, and producer acceptance of nonlethal tools and practices. These reports are made available separately upon completion by NWRC research units.

Attached are state reports which greater detail the accomplishments of each state program funded in the FY2021 Nonlethal Initiative.

Table 4. Project type summary across the states receiving FY2021 Nonlethal Initiative funding. Nevada and Washington funding supported equipment purchase for loan and those accomplishments are reflected in their state report. The "Other" category activities are also described in state reports.

*This is not a cumulative count of WS depredation investigations, it is a count of those conducted by Nonlethal Initiative staff. Other WS employees supported with other funding have conducted additional depredation investigations in FY2021 not accounted for in this table. Please note that depredation investigations are not included in the total projects reported above (682). We want to report the number of depredation investigations completed, as they are an important service provided by WS, but are not considering them "nonlethal projects" under the Initiative. We calculated projects reported by adding all the components above except for depredation investigations (939 in the total column-257 depredation investigation=682 projects).

	# OF PROJECTS												
	Fladry	Range riding	Permanent fencing	Electric fencing	Dog placement	Harassment	Visual and/or audio deterrents	Outreach Events	Depredation Investigations*	Other	Total
AZ	3	0	0	0	0	2	3	0	81	2	91
CA	8	0	0	0	0	0	8	0	10	6	32
CO	0	0	0	0	6	0	0	2	0	0	8
ID	2	14	0	0	0	0	8	1	14	0	39
MI	21	26	0	1	0	11	26	8	16	1	110
MN	13	0	1	0	0	0	0	0	11	0	25
MT	4	26	0	68	0	0	0	5	0	0	103
NM	0	0	0	0	0	0	0	0	112	0	112
NV											N/A
OR	0	149	1	2	0	43	14	4	5	13	231
WA											N/A
WI	6	2	2	1	0	0	1	5	8	132	157
WY	0	5	19	2	0	2	0	0	0	3	31
TOTAL	57	222	23	74	6	58	60	25	257	157	939

ARIZONA

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Introduction

Wildlife Services (WS) -Arizona Program is involved in the Mexican Wolf Reintroduction Project. The Mexican Wolf Reintroduction Project is managed by the U.S. Fish and Wildlife Service in collaboration with the following cooperating agencies to conduct on the ground management: Arizona Game and Fish Department, New Mexico Department of Game and Fish, US Department of Agriculture (USDA) Forest Service (USFS), USDA Animal and Plant Health Inspection Service (APHIS) WS, and the White Mountain Apache Tribe.

A Memorandum of Understanding was created to establish a framework for collaboration that enables the signatory agencies to implement a long-term, scientifically based program to reintroduce and manage Mexican wolves (*Canis lupus baileyi*) in Arizona and New Mexico to contribute toward the recovery of this endangered subspecies, in accordance with the Mexican Wolf Recovery Plan. The primary purpose being to collaboratively implement a scientifically based program to reestablish a viable population of Mexican wolves in Arizona and New Mexico within the Mexican Wolf Experimental Population Area (MWEPA) as defined in the 10(j) Rule, to contribute to the recovery of the Mexican wolf.

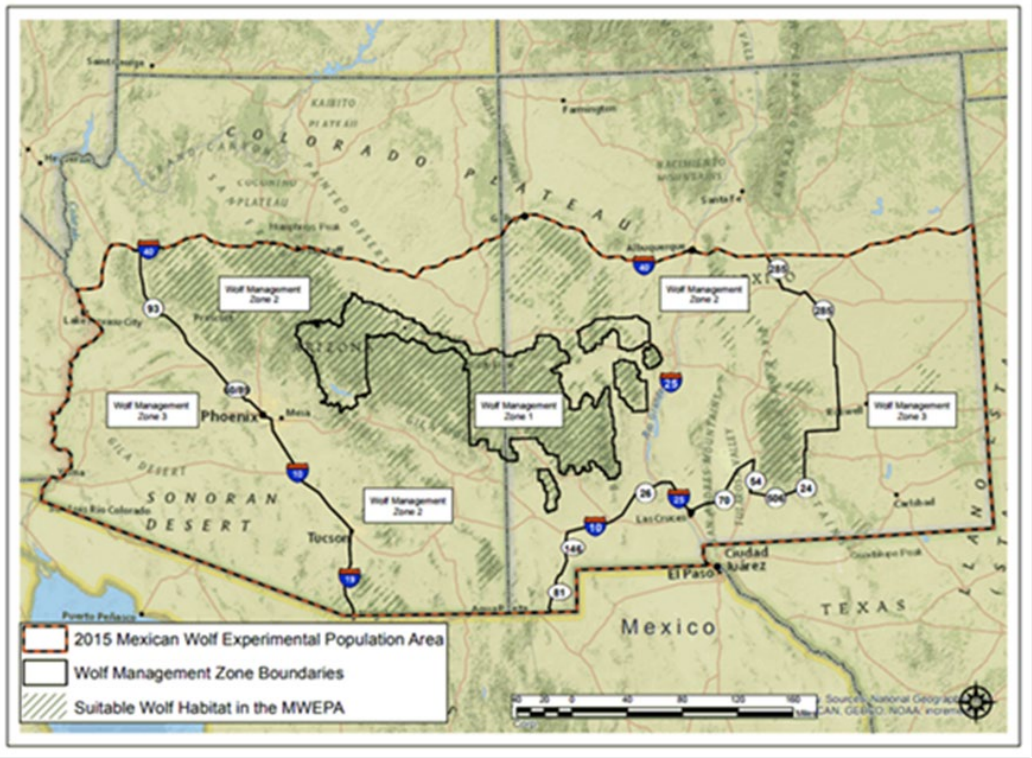

Figure 1: Mexican Wolf Experimental Population Area (MWEPA).

The WS-Arizona Program is part of the Interagency Field Team (IFT) which carries out capture activities (i.e., trapping/darting collaring and releasing), population monitoring, implements nonlethal deterrents, and conducts depredation investigations for Mexican wolf recovery. The IFT's primary responsibilities is to collect data, monitor, and manage the free-ranging Mexican

wolf population. This requires the ability to capture and collar any Mexican gray from the nonessential experimental population on USFS land, tribal lands, and/or private property in Arizona and New Mexico. The WS-Arizona Program has a focus of providing and implementing a variety of non-lethal preventative measures to assist livestock producers to reduce wolf/livestock conflicts.

During FY 2021, the Wildlife Services-Arizona program had one full time employee working on the non-lethal initiative funding who is stationed in Pinetop, Arizona. We also have one full time employee working as needed on the non-lethal initiative funding who is stationed in Alpine, Arizona, and is assigned to the IFT full time. Both employees are responsible for responding to cooperators within the Mexican Wolf Experimental Population Area and conduct depredation investigations and implement non-lethal strategies to minimize wolf/livestock conflicts.

Non-Lethal Management

During FY 2021, the WS-Arizona Program implemented the use of various non-lethal management strategies to attempt to reduce wolf-livestock conflicts in the MWEPA during FY 2021, these management approaches and tools included:

- Fladry: Colored flagging installed around livestock pastures and private property to deter wolves from entering the perimeter of the fladry.
- Fox Lights: motion activated strobe lights installed around livestock pastures and private property to deter wolves from entering pastures or property.
- Diversionary food caches: road-killed native prey carcasses or carnivore logs placed in the field to provide wolves with a food resources to help reduce potential wolf/livestock conflicts where depredations had occurred or was likely to continue. Supplemental food caches were also established in association with depredations in areas where uncollared wolves were known to be located. These supplemental food caches were used as locations to trap wolves that had begun to feed on the caches.
- Hazing: When necessary, the WS-Arizona Program is authorized to use less than lethal munitions (e.g., rubber bullets) and pyrotechnics (e.g., screamers, bangers, and cracker shells) to discourage nuisance and depredation behavior. The use of hazing efforts is conducted by both vehicle and foot in areas with recent depredations on livestock have occurred.
- Trapping: attempts were made to trap and collar, uncollared wolves. Newly collared animals allows the IFT to better manage conflicts since collared wolves can be hazed and managed while uncollared wolves cannot.
- Radio telemetry equipment: WS-Arizona Program uses radio collar monitoring equipment to aid in the detection of Mexican gray wolves. If detected, information is provided to livestock producers to facilitate proactive management activities to assist with preventing wolf/livestock conflicts. The use of monitoring equipment is also useful to monitor wolves in the vicinity of cattle, where hazing techniques can be implemented.

During FY 2021, WS-Arizona employees contributed 1,894 hours of field work involving Mexican gray wolf management. They completed 192 project starts and conducted 81 depredation investigations for 22 cooperators. Wildlife Services-Arizona Program employees competed the Fladry collar study in cooperation with the National

Wildlife Research Center. In FY 2021, WS-Arizona Program implemented three fladry projects to deter wolves from areas where depredations had occurred. Wildlife Services-Arizona Program used a combination of Fox lights and fladry. Wildlife Services-Arizona Program assisted the IFT with establishing and maintaining food caches on cooperator's allotments to help deter predation on livestock. These food caches were also used to help facilitate the capture of uncollared wolves that may have been involved in livestock depredations. This resulted in the capture of two uncollared wolves which helped document the presence of two additional packs of Mexican gray wolves.

FY 2021 Highlights

Fladry

On June 17, 2021, the WS-Arizona Program was contacted by a cooperator requesting that an investigation be conducted. Wildlife Services employees responded and confirmed the incident as Mexican wolf predation. While on the property the employee located another carcass and conducted a second investigation. This second incident was also confirmed as Mexican wolf predation. Both of these animals were depredated in a small pasture approximately 300 yards behind the ranch headquarters. On the night of June 18, 2021, Non-lethal Mexican Wolf Specialist spent the night using telemetry equipment to monitor for Mexican gray wolf activity.

On June 19, 2021, Non-lethal Mexican Wolf Specialist spoke with the cooperator and it was decided that he would install approximately a quarter mile of fladry and four Fox lights around the small pasture. The Specialist placed two trail cameras around the property to assist with monitoring the area. The project was monitored weekly until September 17, 2021. During the aforementioned time period, no wolves were seen on camera and no additional depredations were reported by the cooperator.

On September 6, 2021, WS-Arizona was contacted to do an investigation on depredated domestic sheep. Upon investigation Wildlife Services employees found four depredated sheep and three injured sheep. During the investigation, it was determined that Mexican wolves were responsible for the depredation and injuries. The cooperator reported that he was moving the remainder of his flock to a to a small corral approximately 20 yds behind his home. The Non-lethal Mexican Wolf Specialist spoke with the cooperator and it was decided that he would install fladry and two Fox lights around the corral along with a trail camera. This equipment was monitored weekly, and no further depredation were reported. However, on September 21, 2021, Wildlife Services was contacted again by the cooperator to conduct multiple investigations. Upon arrival, another four sheep had been depredated and three additional sheep were injured. The investigation determined that Mexican wolves were responsible for the additional depredations and injuries. In response to the September 21 event, a decision was made to install one mile of fladry along the perimeter of the property adjacent to the forest boundary along with seven trail cameras, and 12 Fox lights. After the addition of the new fladry, no wolves were seen on camera and no additional wolf depredations were reported. The fladry for this project was removed on November 16, 2021.

Food Caches

During the months of June and July 2021, WS-Arizona Program assisted the Arizona Game and Fish Department with stocking a diversionary food cache in the Blue River Primitive Area. The food cache was only accessible by horseback and food for the cache had to be packed in by horseback. The food cache was focused on a pack which the IFT determined as being responsible for five depredations on a nearby cooperator's ranch.

On September 27, 2021, WS-Arizona Program set a food cache on a USFS allotment with the intention of trying to get an uncollared pack of Mexican wolves on the cache to trap and collar one of the pack animals. The animals in the pack had been responsible for three cattle depredations. This food cache was monitored and replenished by the Wildlife Services-Arizona Program. On October 19, 2021, Mexican wolves were caught on camera feeding on the food cache. In response to the feeding and camera picture, traps were set and subsequently on October 23, 2021, an uncollared Mexican wolf was trapped, collared, and released. The newly collared animal helped to verify the presence of a new pack.

Figure 2. Photograph of uncollared wolves feeding on a food cache in Arizona.

Hazing:

On July 12, 2021, WS-Arizona Program was contacted to conduct a depredation investigation for a cooperator. The incident was confirmed as Mexican wolf predation. In response the cooperator had asked for human presence to haze any wolves from her two USFS allotments until the cattle could be moved out of the area. Over the course of three days, the Non-lethal Mexican Wolf Specialist spent approximately 10 hours monitoring for wolf activity and hazing in response to the activity. Equipment used included: telemetry equipment, air horns, thermal imaging monoscope, and spotlights. Between the efforts of WS-Arizona Program and other IFT personnel, depredations in this area came to a halt during this period. However, on July 28, 2021, WS-Arizona was contacted again regarding a depredation investigation. The incident was confirmed as

wolf predation and over the span of the next week approximatley 20 hours were spent monitoring and hazing the local Mexican wolf pack. No additional depredations were reported in this area during this time.

On July 25, 2021, WS-Arizona Program assisted the IFT in searching for a Mexican gray wolf that had been reported chasing vehicles.

On August 8, 2021, WS-Arizona was contacted to do multiple depredation investigations for a cooperator. During the investigation four cattle were confirmed as being depredated by Mexican wolves. Over the next week, WS-Arizona Program and other IFT personnel attempted to monitor and haze for Mexican wolf activity in the area where the depredations had occurred. Equipment used included: telemetry equipment, air horns, thermal imaging monoscope, and spotlights. No additional depredations were reported in the area during this time.

Proposed Activities for FY 2022

- Continue to respond to cooperators and conduct Mexican gray wolf depredation investigation.
- Continue to work with cooperators to implement non-lethal strategies to reduce Mexican gray wolf/livestock conflicts.
- Continue to work with the IFT to locate and mange uncollared Mexican gray wolves.
- NWRC Non-lethal Research Project-continue to assist NWRC with data collection for research projects involving developing non-lethal strategies for managing Mexican gray wolves.

CALIFORNIA

2021 - CALIFORNIA WILDLIFE SERVICES NON-LETHAL INITIATIVE END OF YEAR REPORT

Prepared by:

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November 2021

Whaleback pack in Siskiyou County outside the WS fladry enclosure.

INTRODUCTION

In the past several years detections of gray wolves in California have increased. The presence of wolves has caused controversy among livestock producers because of the lost revenue from depredations attributed to wolves. In fiscal year (FY) 2020, Wildlife Services-California (WS-California) established a full time Non-lethal Wildlife Specialist position located in northern California. This position works with wolf-livestock conflict resolution in Lassen, Plumas, Sierra, Modoc, Shasta, and Siskiyou counites. WS-California devotes several human and equipment resources to resolving conflicts involving gray wolves that are harassing or killing livestock.

The is a critical position which reduces the likelihood of losses from wolves by proactively setting out equipment and responding quickly to investigations of dead livestock.

HISTORY OF WOLVES IN CALIFORNIA

In 1924, the last known gray wolf in California was killed in Lassen County. In 2011, a dispersing male wolf known as OR7 entered California from Oregon. The presence of a wolf in California generated a high level of public interest which led to California Department of Fish and Wildlife (CDFW) preparing a conservation and management plan. The California Fish and Game Commission listed gray wolves as an endangered species under the California Endangered Species Act in June 2014. Since the appearance of OR7, there has been confirmation of several dispersing wolves from Oregon, as well as three breeding packs (Whaleback, Shasta, and Lassen packs) and one non-breeding pack (Beckwourth pack). The Shasta pack was last detected in 2015, however, the Lassen, Shasta and Beckwourth packs are still present in California.

Detected wolves collared by CDFW and Oregon officials in California:

OR7	Detected in California December 2011. Unknown fate since 2019.
OR25	Detected in California in 2015. Found dead in Oregon in 2017.
OR44	Detected in California December 2016. Collar failed in 2018.
OR54	Detected in California January 2018. Found dead in Shasta County February 2020.
OR59	Detected in California February 2018. Found dead in Modoc County December 2018.
OR85	Detected in California 5 November 2020. Breeding male of the Whaleback pack.
OR93	Detected in California 30 January 2021. Found dead November 2021 in Kern County from a vehicle collision.
OR103	Detected in California 4 May 2021.
LAS13M	Dispersed into Oregon 19 October 2020.
LAS01F	Unknown origin. Breeding female of the Lassen pack 2017-2020; produced four litters. Collar stopped working in 2020 and the female is no longer the breeding female of the Lassen pack.
LAS09F	Offspring from former alpha male of the Lassen pack. Had her first litter in 2020 with the current alpha male (LAS16M) of the Lassen pack and her second litter in 2021. Only CA functioning collar.

Current non-collared wolves in California (identified through genetic testing conducted by CDFW Investigations Lab):

LAS12F	Offspring from Lassen pack now part of the Beckwourth pack.
LAS16M	Unknown origin. Breeding male of the Shasta pack since 2020.

CALIFORNIA WILDLIFE SERVICES ACTIVITIES SUMMARY

As populations of gray wolves continue to expand within the Pacific Northwest, California will continue to see dispersing wolves enter the state and potentially develop new packs and maintain territories. Populations of wild ungulates such as mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) have decreased in many parts of California over the years. These wildlife species are a major part of the wolf diet. The decreases in wolf prey items, and the increasing presence of wolves in California, has led to wolves depredating livestock. WS-California has observed and documented numerous wolf-livestock conflicts over the past 10 years. WS-California works to find ways to reduce losses for livestock producers while not harming wolves as they are protected by California Endangered Species Act. Techniques that have been employed are turbo fladry, fox lights, audible scare boxes, range riding, night penning, and public education.

Technical Assistance

WS-California provides technical assistance (TA) in the form of written and verbal information and demonstrations of techniques such as fladry to both the public and to wildlife professionals.

WS-California provided TA to 98 parties during FY2021 in Modoc, Lassen, Plumas and Siskiyou counties.

Operational Assistance

WS-California provides non-lethal operational assistance for landowners experiencing livestock damage from wolves. The primary technique applied by WS-California is the installation of turbo fladry. Turbo fladry has been successful in California and is becoming more popular in the ranching community. WS-California will not leave fladry out for long periods of time due to concerns that wolves will become habituated to it and decrease the effectiveness of the tool. WS-California has trail cameras (66), Foxlights Night Predator Deterrents (45), scare boxes (5), and 10 miles of fladry and supplies. WS-California has modified a UTV to enable personel to more efficiently install and remove fladry. WS-California collects and monitors data using USDA Wildlife Services Management Information System and the ArcGIS Collector app.

WS-California installed four fladry projects during FY2021 (Table 1). Some of the fladry projects have trail cameras installed on the perimeter to track animal activity. There have been no photos or videos taken of wolves crossing fladry projects in California.

Table 1. Turbo fladry, audio and visual projects installed by WS-California personnel in FY20.

Date Set	Date removed	# days	Location	County	Lin. Yards	Camera	Fox lights	Scare box
8/26/2020	11/12/2020	79	McKenzie Meadows	Lassen	5,267	4	6	1
12/3/2020	5/7/2021	156	Neers	Plumas	1,232	4	6	0
12/9/2020	5/13/2021	156	Pearce	Plumas	1,760	5	0	0
1/6/2021	4/16/2021	100	Chase	Siskiyou	1,964	6	0	0
2/14/2021	5/20/2021	96	Kingdon	Plumas	1,200	0	0	0
6/23/2021	8/6/2021	44	Clover Valley	Lassen	886	1	4	0
7/8/2021	8/4/2021	27	McKenzie Meadows	Lassen	0	10	9	2
9/2/2021	11/23/2021	82	McKenzie Meadows	Lassen	0	0	9	1

The Dixie Fire burned 963,309 acres in 5 counties including Butte, Lassen, Plumas, Shasta, and Tehama from 13 July 2021 to 25 October 2021. WS-California had to quickly remove equipment from Clover Valley and McKenzie Meadows in Lassen county in August 2021. WS-California suspended installing equipment during August 2021 due to the unpredictable fire activity and assisting landowners in fire impacted area.. The Lassen pack survived the Dixie Fire, but has relocated multiple times.

Wolf track at a fladry project (left), WS-California employee installing turbo fladry (right).

Livestock Investigations

In addition to installing fladry, scare boxes, fox lights, trail cameras and providing technical assistance, WS-California personnel conduct investigations of livestock kills or unknown deaths. WS-California recieves a large number of calls from livestock producers reporting dead livestock. Personnel conduct investigations to determine the cause of death. They are typically conducted in conjunction with CDFW biologists and/or State game wardens. WS-California personnel utilize their expertise as to determine the cause the livestock death. At completion of the investigation photographs and a report are provided to CDFW. CDFW makes a final determination based on the information provided by WS-California. WS-California personnel were involved in 16 livestock investigations in FY2021 (Table 2).

Table 2. Livestock investigations performed by WS-California personnel in FY2021.

Date	Livestock	Land Ownership	County	Confirmed, Probable, Non-predation	Comments
10/19/2020	cow	private	Lassen	Confirmed	
10/22/2020	heifer	private	Lassen	Non-predation	
10/27/2020	cow	private	Lassen	Non-predation	
10/30/2020	heifer	private	Lassen	Confirmed	
10/31/2020	heifer	private	Lassen	Confirmed	
11/7/2020	calf	private	Lassen	Non-predation	
11/24/2020	cow	private	Lassen	Non-predation	
2/24/2021	4 calves	private	Modoc	Non-predation	domestic dog
4/25/2021	2 cows	private	Lassen	Non-predation	
5/25/2021	cow	private	Plumas	Confirmed	

Livestock necropsy performed by WS-California personnel in Lassen County, CA.

Interagency Coordination Meeting

USDA WS-California attends a quarterly interagency wolf conference call with CDFW and USFWS to discuss wolf activity in California and Southern Oregon. There was no interagency wolf coordination in person meeting in Redding, CA due to Covid.

Gray Wolf Working Group

The California Gray Wolf Working Group is made up of government and non-government agencies, including California Department of Fish and Wildlife, California Department of Food and Agriculture, California Cattleman Association, Lassen County Agriculture, Modoc County District Supervisor, Rural County Representatives of California, UC Extension, Defenders of Wildlife, Center of Biological Diversity, Office for Senator Dahle, and WS-California. WS-California has two representatives on the working group. The main group meets virtually every other Monday of the month, while the subcommittee for Program Drafting meets the opposite Mondays. Currently the committee is looking at pay-for-presence and funding for cooperators in wolf areas that have lost livestock from wolf depredations.

COLORADO

United States Department of Agriculture

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Colorado Non-Lethal Summary
November 26, 2021

Colorado Non-lethal project Update

The Colorado Wildlife Services program was given $35,000 in funding to be used in FY 2021 for non-lethal livestock protection. This funding supports one part time specialist who administers the non-lethal program in addition to other duties. The Colorado non-lethal program consists of placing Turkish Kangal livestock guardian dogs (LGD) with both wool growers and cattle ranchers throughout Colorado. There is an emphasis on placing dogs in areas with known wolves, however these dogs protect against other large predators as well. This position conducts non-lethal work year-round. In addition to LGD placements, this position conducts outreach to promote the non-lethal program and let producers know how Wildlife Services can help mitigate predator damage. We planned to hold at least five events along the front range and in the western slope counties where wolves have been reported. Unfortunately, no public events took place in 2021 due to continuing COVID-19 restrictions on travel and in-person events. We hope to begin holding in-person events soon.

Although our outreach was limited due to COVID-19, we were able to attend two association meetings in 2021. The first was the Cattlemen's Association meeting which had about 300 people in attendance. Approximately forty people were talked to directly about non-lethal work. Contact information was gathered for five individuals interested in the dog placement project. The Wool Growers Association annual meeting was attended as well with roughly 58 people in attendance. A presentation was given to them all about the non-lethal program and dog placement effort. Of the six cooperators served in 2021 for dog placements, three were completely new to working with Wildlife Services. The other three only receive limited services intermittently (Table 1.).

Table 1.

Type of Project	# completed in FY21	# of cooperators served	Any additional notes
Dog placement	6	6	
Outreach Events	2	40, 58	Cattlemen's and Wool Growers meetings

The breakdown of cost can be seen in table 2. The largest single purchase for this project was the procurement of the Kangal dogs. It accounts for approximately 20% of the 2021 non-lethal budget allocated to Colorado. As with many good working dogs the Kangal dogs can be pricey. We were able to secure a discounted price with the two breeders we work with.

Table 2.

Breakdown of Cost

	Cost	Percent
Personnel	$17,409.74	49.74%
Vehicle Costs	$4,908.41	14.02%
Kangal Puppies	$7,200.00	20.57%
Supplies	$5,481.85	15.66%
Total	$35,000.00	100.00%

The 2021 Kangal dog placement went well. We planned to place six dogs in 2021, however due to unforeseen circumstances we were able to place eleven LGDs. These dogs went to a variety of locations throughout Colorado. Four dogs went to two different cattle operations in Moffat county. Two went to a wool and cattle operation in Routt county. Two went to a cattle ranch in Jackson county. One dog went to a niche Welsh Black Mountain Sheep operation in Delta county. And lastly, two went to a wool grower in Montrose county.

Between 2020 and 2021 we have placed a total of fifteen Kangal dogs, six of which are in areas with wolf activity. We have LGDs with three cattle operations and four wool operations, as well as one ranch that produces both wool and cattle. This breed of dog is somewhat uncommon in the United States but has been used for hundreds of years in Turkey to protect livestock from wolves and other large predators. We are conducting annual surveys to determine these dog's efficacy protecting livestock from black bear and potential wolf damage with plans to summarize results in a publication. We believe livestock guarding dogs can be effective in protecting cattle as well as sheep. We plan to continue placing dogs annually and monitoring them for as long as possible.

We have had a good amount of success with this program based on anecdotes from participants. There have been a few issues, but by far the feedback we've received about the dogs and in turn the service we provide is overwhelmingly positive. Our wool growers participating in the project tell us that the dogs work very well with the sheep and run off predators that come around. We have one wool grower in Delta County who has been using protection dogs for a few decades now and says the male Kangal dog we placed with him in 2020 was the best working dog he has ever had. It was single handedly responsible for mitigating damage from at least fifteen potential black bear depredations in the 2021 summer season on range. We are optimistic that the dogs we placed with cattle operations will provide tremendous service this winter/spring during calving season.

We chose Kangal dogs in part for their temperament and reputation for being fierce with predators but friendly with people. This however has led to two of our Kangal

dogs being picked up by recreationists and taken to the local shelter. This is an issue we considered but we believe this is preferable to having dogs that are aggressive to people while working. Colorado has a large population of recreationists that enjoy the rugged and beautiful terrain; however, this can put them in direct contact with livestock ranging on public lands. We are doing everything we can to mitigate conflict with predators and livestock as well as recreationists and protection dogs. It is for this reason that in addition to having all the appropriate shots and vaccinations, all the dogs we place are microchipped to the new owner or Colorado Wildlife Services in the meantime. In 2021 we had to retrieve a Kangal dog that was taken from the high country in the Steamboat Springs area and brought to the Denver area before the microchip was read and we were contacted. The dog was safely reunited with its herd and we used the incident to spread awareness about working livestock guarding dogs.

Above left: State Director Martin Lowney and Wildlife Specialist Jon Moore transporting Turkish Kangal puppies to be placed with producers on west slope. 2020 & 2021.

Above right: Six Turkish Kangals being transported from the breeder in Texas to Colorado to be placed with cattle ranchers on the west slope. January 2021

Right and below: One of our Turkish Kangals protecting sheep on summer range (right) and on winter pasture (below)

IDAHO

USDA/APHIS

IDAHO – WILDLIFE SERVICES

END OF YEAR SUMMARY – 2021

Introduction:

Agriculture is a multibillion dollar per year industry in the state of Idaho (State Agricultural Overview, 2019). Part of this billion-dollar industry is raising livestock (sheep, cattle, pigs, etc.) that can be marketed and sold throughout the world for human consumption, clothing (wool and leather), and other uses (Photo 1). In 2020, there were approximately 2.5 million head of cattle within Idaho (National Agricultural Statistics Service, 2021). Additionally, there were approximately 250 thousand sheep in Idaho in 2017 (National Agricultural Statistics Service, 2021).

A large portion of these cattle and sheep are raised on local family farms and ranches. These farms and ranches vary in production size from a few animals to tens of thousands. Therefore, areas needed to graze and raise these animals also vary in size from a few acres to hundreds of thousands of acres. Throughout the year, livestock producers can expect to lose a certain percentage of their livestock from various reasons such as complications at birth, sickness, and other natural mortality. Additional loses throughout the year can come from livestock being killed by predators. Depredation on livestock from predators can take place in corrals and pastures close to home, but also in large open desert and forest landscapes.

Today, raising livestock in certain landscapes and mountainous areas is not as easy as it once was. Over the last 25 years many prime livestock grazing areas in Idaho are now frequented by gray wolves (*Canis* lupis). Additionally, grizzly bears (*Ursus arctos horribilis)* have significantly expanded in many areas within Idaho. This has caused livestock producers in these areas great concern. On top of "normal" operating expenses, ranchers must now hire additional employees (range riders) to spend additional time on the landscape trying to prevent their livestock from being killed. Ranchers hope that if their range riders spend additional time with the cattle, it will prevent some of these losses. Range riders must spend more time among their cattle to see if depredations are taking place and if so, to what extent. This can be determined by finding dead or injured livestock and/or adult livestock constantly searching for their young.

This range riding husbandry practice is not new, but in many areas, it does require a considerable amount of additional time, cost, and resources. With these additional costs and the loss of livestock, livestock producers can see an increased annual financial burden of tens of thousands of dollars. These

conflicts have gained the attention of agricultural communities, state Fish and Game departments, county commissioners, state Governors, legislatures, other political interests, and conservation groups. Because wildlife is a public trust resource managed by the government for the people. A commonly voiced argument for publicly funded wildlife damage management is that the public should bear the responsibility for damage to private property caused by "publicly-owned" wildlife. This argument, among many others has caused the management of some wildlife species, particularly wolves and grizzly bears to be extremely controversial.

Ranching with Predators:

As livestock producers have experienced throughout the world, predators are attracted to livestock, which can result in the death of highly valued cattle, sheep, goats, etc. Likewise, as these conflicts arise, the death of highly valued wildlife such as wolves, bears, mtn. lions, etc. can also occur. Some of these conflicts and losses take place on private property, just outside the backdoor in the henhouse. Others take place in the pasture just out of eyesight. But, most livestock such as cattle, sheep, or goats are increasingly vulnerable to depredation by large predators (i.e., coyotes, gray wolves, grizzly bears, or mountain lions) as they graze on the landscape away from human presence.

Due to remote locations, human presence may be limited for various reasons, as a result, depredation may increase and the evidence of depredations may never be found (e.g., carcass of a small calf or lamb). Landscapes can vary from large expanses of open sagebrush steppes, grasslands, and prairies, to steep wooded mountains. Therefore, depending on the topography and vegetation, evidence of conflicts between large predators and livestock may be hard to find. To address this problem, livestock owners have invested in several different nonlethal husbandry practices to prevent livestock from being killed and/or harassed by predators. Some of these methods include herders, guard dogs, range riders, electric fencing/fladry, and other husbandry practices. For example, in small pastures and on large landscapes, guard dogs are a great way to prevent livestock losses from predators, but some guard dog breeds are better than others when dealing with wolves and grizzly bears (Kinka & Young, 2018).

Each husbandry practice has a varied level of success depending on how, when, and where its applied. For example, sheep and goats like to be in tight groups (bands), which can consist of over 2,000 individuals per band. Herders (e.g., sheep herders) are extremely successful tending and watching over these bands because of the tight groups sheep and goats like to be in. Guard dogs can also be successful guarding sheep and goats because of the tight bands that are formed and maintained. However, it's increasingly difficult for guard dogs or herders to protect livestock if they are scattered across the rangeland, such as cattle.

Electric fencing can also be successful if set up and used properly, but it can be limiting depending on the size of area being fenced and a power source to produce electricity. One type of electric fencing is called "turbo fladry", which is another tool gaining popularity to protect livestock in certain scenarios (Photo 2). Turbo fladry is an electrified wire fence that

has 18-22in., red flags attached that blow in the breeze. The flags are a novelty and look intimidating to a predator that is not familiar with it, initially. Apprehension or fear alone can deter predators for a period, but as a predator habituates to the flagging, they may try to pass through the fence and if they contact the electrified wire, the shock will reinforce the fearfulness of the flags (Young et al, 2018). As mentioned above, turbo fladry is most successful in smaller settings such as calving and lambing pastures when trying to reduce or prevent wolves or other canids from depredating on livestock.

Nonlethal range riders are also an important husbandry practice frequently used to protect livestock in large landscape (5,000 + acres) scenarios. Unlike sheep and goats, cattle don't like to be in tight groups. Therefore, its important the range rider is mobile enough to watch over them as they are scattered across large areas. This mobility may refer to riding a horse for hours each day watching over the cattle, searching for sign of predators frequenting the area, and being a human presence on the landscape. Sheep bed together at night where herders, guard dogs, and Radio Activated Guard (RAG) boxes can be used to keep predator away (Photo 3).

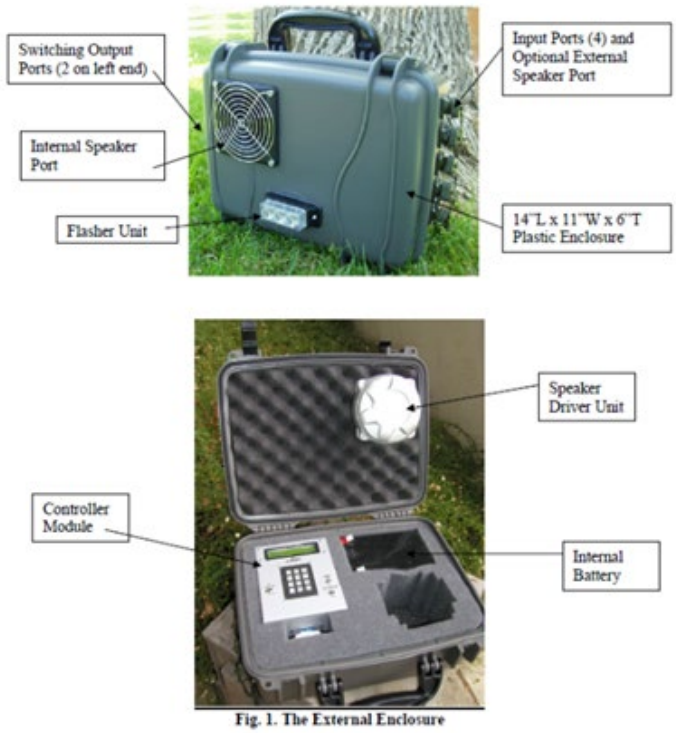


Photo *3. Radio Activated Guard box*

WS Nonlethal Range Riders and Fladry Projects in Idaho:

To help protect livestock, the United States Department of Agriculture (USDA) Wildlife Service (WS) program in Idaho hired three fulltime seasonal range riders in 2021 to help protect livestock in numerous areas of the state. In 2021, WS also implemented fladry projects on private property in another location in Idaho. As previously mentioned, all livestock producers have employees that take care of their stock, but in some situations, there may be a need for additional WS range riders or tools that WS can provide.

All three WS range riders conducted several nonlethal projects during the 2021 grazing season. Each range rider was assigned a different location within Idaho to work with specific livestock producers, which have had chronic livestock depredations in the past. Most of these depredations have been wolf related, but some have been related to grizzly bears, black bears, mtn. lions, and coyotes. These nonlethal projects took place on a combination of private and public lands, including the Payette National Forest, Sawtooth National Forest, Caribou/Targhee National Forest, and the Salmon/Challis National Forest. The private property where some of these activities took place was within proximity to the National Forest. Four additional WS employees traveled from other locations to assist in this fladry project.

Public lands where livestock grazing occurs are referred to as grazing allotments and are administered by the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the Idaho

Department of Lands (IDL). WS range riders carried out nonlethal activities on all four land classes. WS range riders had to adhere to the same regulations set for livestock owners (permittee) that graze livestock, and the recreationalists that camp, hunt, hike, or use All-terrain Vehicles (ATVs) on public lands.

WS range riders ride horseback throughout specific allotments that have been designated for cattle grazing during this grazing season. Prior to the beginning of the grazing season, the USFS and BLM coordinate with the permittees (livestock owners) and determine the Annual Operating Instructions (AOIs) for each grazing season and allotment. Each AOI consists of many different rules that must be strictly followed by the permittee (e.g., weed free hay/straw, designated grazing routes, and fees etc.) Each AOI also has specific dates when cattle are allowed on the allotment and a specific number of days the cattle or sheep can graze on each allotment before rotating to an adjacent allotment. The AOI also dictates the number of cattle or sheep allowed to graze on each allotment.

WS range riders in each area will be limited on the number of allotments they can work at any given time. This would allow a maximum number of days per week to be spent in each allotment amongst the livestock. For example, if a range rider worked in 30 different allotments, their presence would only be seen one day per month on each allotment. This would be of no benefit to anyone. WS range riders do have flexibility, therefore, if there are conflicts with predators within one allotment, but no conflicts in surrounding allotments, all attention (5-6 days per week) would be focused in one area. Additionally, WS range riders will be required to spend the day riding within proximity of the livestock, but far enough away as to not disrupt normal foraging behavior.

A map of Idaho and the locations of each WS range rider and fladry project is on the page below.


Idaho Panhandle National Forest
Clearwater National Forest
Nez Perce National Forest
Payette National Forest
Salmon-Challis National Forest
Boise National Forest
Sawtooth National Forest
Caribou-Targhee National Forest
Caribou-Targhee National Forest
Sawtooth National Forest

Range Rider 1 – Salmon/Challis National Forest:

The WS range rider working on the Salmon/Challis National Forest carried out nonlethal activities within four different grazing allotments. Grazing within these four allotments were approximately 5,000 beef cows on a combined total of 240,000 mountainous acres. Being on horseback gave the range rider the advantage of following the livestock throughout the landscape regardless of roads or trails. Depending on the AOIs, cattle will start to arrive on some of these allotments June 1 and will rotate between specific allotments until October 15. During this time, the cattle will be able to freely roam across the allotment foraging across ridge tops, mountain sides, and valleys, while drinking from mountain streams, manmade water holes, and strategically placed watering tanks (Photo 4).

Photo 4. Grazing cattle (Credit USDA-WS)

Livestock owners and hired employees spend a lot of time ensuring the cattle are not overgrazing certain areas of the allotment (e.g., riparian zones and creek bottoms) per the AOIs instructions. Cattle must be scattered out so that they do not overgraze and degrade the landscape. WS range riders must be careful not to disturb the cattle, which could cause them to move into undesired locations. The permittees and their employees work hard to keep the cattle in their proper locations; therefore, the range riders had to build trust and ensure they would not disrupt the cattle.

Duties:

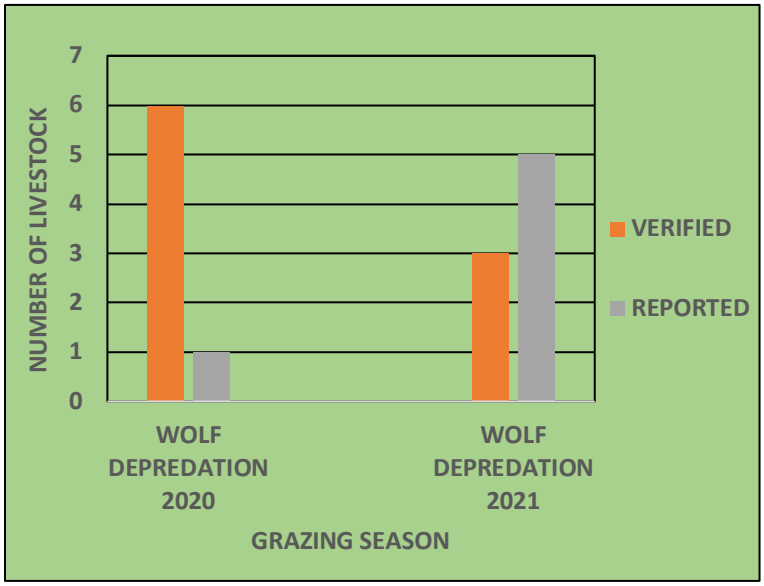
As mentioned above, this WS range riders worked on four different USFS allotments during the 2021 grazing season. Throughout the season, only one or two allotments were worked at any given time, allowing a maximum number of days per week to be spent in each allotment amongst the cattle. Historically, wolves depredating on cattle is this area is almost exclusively the main source of conflict. At the beginning of the 2021 grazing season there were no conflicts in this area, therefore, the WS range rider started working in one allotment with historic wolf/cattle conflicts. Identifying if wolves were frequenting the area was the first goal. Then, identifying how many wolves and where they are frequenting was the second goal. This information will identify areas that need additional time spent to ensure conflicts don't start. This information is also passed along to the livestock owners and they can also be more vigilant in these locations or change the grazing plans to avoid conflicts.

The WS range rider in this area was focused on numerous things while surveilling allotments and cattle:

1. Identifying cattle demonstrating nervous behaviors (e.g., grouped up at one end of the allotment, not staying in proper locations, and calling for each other or their young).
2. Looking for predators within the area and trying to get them displaced.
3. Looking for sign (e.g., tracks or scat) indicating what predators are frequenting the area.
4. Checking trail cameras regularly to see what is passing by without being noticed by the range rider.
5. Looking for evidence that a depredation has occurred unnoticed (e.g., calf carcass), and

6. Act as a visual, audio, and scent deterrent to predators in the area.

The WS range rider also set up 12 trail cameras in the best possible areas to detect predator activity. If predator activity was determined to be low in one area, but high in another area, the range rider switched time and efforts to new locations. With the ability to shift time and efforts when needed, the range rider was able to better reduce or prevent conflicts between large predators and cattle.



Graph 1. Livestock losses to wolves, by year, in the allotments surveilled by WS range rider in the Salmon/Challis National Forest.

Wolf/Cattle Conflicts:

In June, WS confirmed that wolves had killed a cow in a different allotment, therefore, this was the new primary area of focus for the range rider. There was a radio collared wolf frequenting the area for a year, but there were no reported conflicts in this area during the 2020 grazing season. Nevertheless, numerous wolf tracks accompanied the radio collared wolf, indicating there was a pack of wolves frequenting the same area as the livestock. The WS range rider increased time in this area, and likewise, the livestock owners also increased their time within this area. Within a few weeks, WS confirmed that wolves had killed two calves in the allotment with historic and chronic depredations. At this time, the WS range rider divided time into both allotments. For the next couple months, there were reports of more wolf/cattle conflicts in both allotments. But, with the vigilance of the WS range rider and livestock owners, verified losses were less this year than last year amongst these four grazing allotments (Graph 1). There were more reported losses in 2021, but WS could not verify they were killed by wolves.

Range Rider 2 – Caribou/Targhee National Forest:

Introduction:

The WS range rider project on the Caribou/Targhee National Forest was a combined effort with Federal and State agencies, and local livestock producers. This report covers the second grazing season of this project, which began June 1, 2021 and ended October 15, 2021. The WS range rider worked closely with six livestock producers and

Photo 5. Two gray wolves and grizzly bear (Credit USDA-WS)

their cattle, while grazing across two forest allotments to minimize livestock depredation by wolves and grizzly bears (Photo 5). Within these two allotments, approximately 1,300 head of cattle rotated throughout different locations over the five-month grazing season. The desired outcomes were to mitigate livestock-predator conflicts, reduce cattle losses, reduce wolf and grizzly bear mortalities, find livestock carcasses, and remove them, document presence of predators and alert livestock producers of predators among their herds.

Orientation and Communication:

Initial orientation to the area was provided by livestock owners who had been grazing in this area for years. They were able to provide years' worth of knowledge that could be built upon. As the WS range rider built upon this information throughout the season, valuable time was spent by livestock owners and the WS range rider in specific areas to prevent conflicts. Much of this information was gathered by trail cameras placed in areas where livestock would frequent. Gray wolves and grizzly bears are opportunistic predators and when livestock are encountered, they may take the opportunity to pursue them. Wolves and grizzly bears are also often attracted to some of the same area's cattle frequent (e.g., watering holes), especially during the heat of the summer (Photo 6). This is a great concern, and permanent solutions are unknown. Adding to the problem, these locations can be numerous across the allotment and one person can't be in all places at the same time. Although, if these areas frequented by cattle, wolves, and grizzly bears can be identified, additional time can be spent by the range rider and livestock owners to see if depredations or other conflicts are occurring. Therefore, communication with permittees was established early and occurred frequently throughout the summer.

Photo 6. Grizzly bear wading in water hole (credit USDA-WS)

Duties:

The WS range rider in the Caribou/Targhee forest was the same as in other areas.

1. Identifying cattle demonstrating nervous behaviors (e.g., grouped up at one end of the allotment, not staying in proper locations, and calling for each other or their young).
2. Looking for predators within the area and trying to get them displaced.
3. Looking for sign (e.g., tracks or scat) indicating what predators are frequenting the area.
4. Checking trail cameras regularly to see what is passing by without being noticed by the range rider.
5. Looking for evidence that a depredation has occurred unnoticed (e.g., calf carcass), and
6. Act as a visual, audio, and scent deterrent to predators in the area.

A typical work week consist of 3-5 full workdays, and within 8-hour workday, 5-6 hours were spent riding horseback. The goal was to alternate riding between each allotment throughout the week. Game cameras were check at the beginning and end of each week.

Field observations:

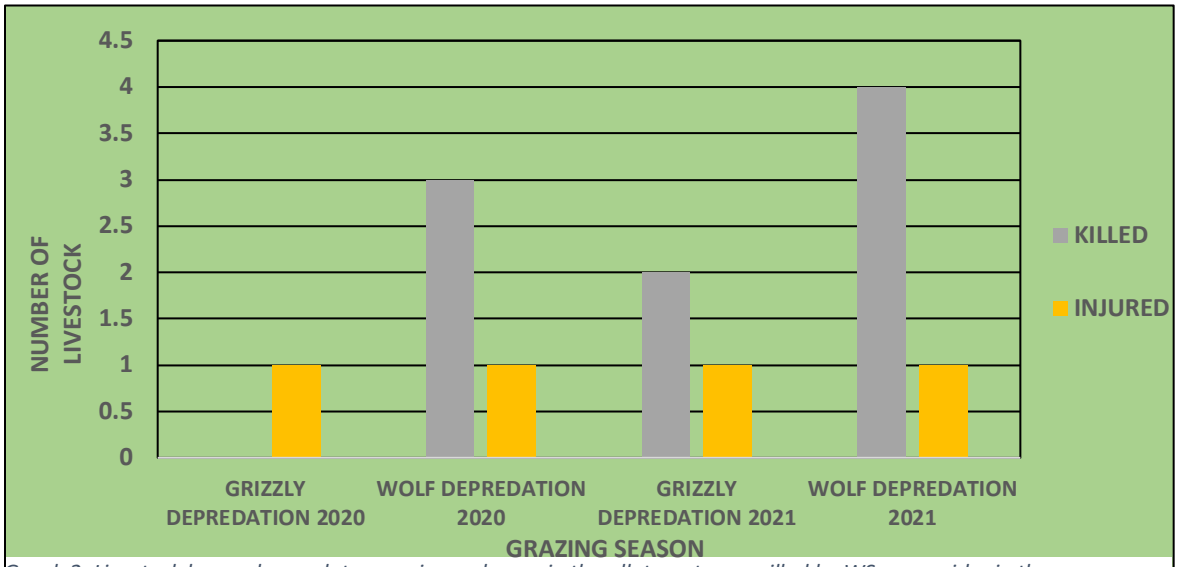
During the riding season, cows were monitored for nervous behavior, injuries, illnesses, game cameras checked and documented, and cattle relocation due to signs of high predator traffic. Additionally, observing behavior of other wildlife can give an indication that conflicts may have occurred. For example, during an observation ride, an excess number of birds circling the tree line was notices. After a short search, a calf carcass was found. Game cameras were set up for observation of predators in the area. The livestock owner, association herder, and state Fish and Game were contacted as soon as possible. That evening the livestock owner went to observe and found lots of wolf sign. The following day, the state Fish and Game investigated and confirmed that wolves killed the calf and then they removed the carcass. Game cameras placed at the site indicated that a pack of 6 wolves were at the kill that night (Photo 7). Cattle were no longer in that area due to predator pressure. These two grazing allotments cross over the state line into Wyoming. In this location, the Wyoming Game and Fish Department investigate potential livestock depredations. In Idaho, Wildlife Services investigate potential livestock depredations.

Wolf/Grizzly bear/Cattle Conflicts:

Grizzly bear expansion in Idaho is increasing every year, but in some areas grizzly bears have been present for decades. In these two grazing allotments, livestock owners have been dealing with grizzly bears and wolves for decades. Although it's never been tracked, it seems like grizzly bear conflicts with cattle increase after wolves start depredating on the cattle. The reasoning is that when wolves kill an animal (deer, elk, cattle, etc.), the carcass then attracts bears. At this point, some grizzly bears may start killing livestock also. Nevertheless, there are many factors that could influence how many conflicts there are between livestock, wolves, and grizzlies. As mentioned above, this is the second year a WS range rider has been working in this area. In the 2021 grazing season one more calf was confirmed to be killed by wolves than in the 2020 grazing season (Graph 2). Likewise, grizzly bear conflicts were higher in 2021 than in 2020. Is this a direct correlation with a slight increase in wolf conflicts? Nevertheless, in past years, wolf and grizzly bear conflicts in this area has been much higher.

Livestock producers that grazing in this area greatly appreciate the assistance and professionalism WS provide to them. As WS range riders become more familiar with the area, wildlife patterns, and

continue to strengthen the partnership between livestock owners, state and federal agencies, and conservation groups, the success will continue to be seen. Obviously, we all know that conflicts will continue in the future, but if WS can help keep the conflicts at a minimum, this work will be considered a success.



Graph 2. Livestock losses, by predator species and year, in the allotments surveilled by WS range rider in the Caribou/Targhee National Forest.

Consideration for the Next Season:

The WS range rider and the livestock producers felt like the efforts made this year was effective in minimizing depredations from both wolves and grizzly bears. The WS range rider feels like next year will be even more effective with increased familiarity of the area and knowledge of livestock and predator patterns. As mentioned above, WS range riders are not expected to bring conflict to zero, but at a level that is tolerated.

Range Rider 3 – Payette National Forest:

Introduction:

The WS range rider working in the Payette National Forest started 9/10/21 and ended 10/13/21 with an abbreviated season. The position focused on 8 sheep allotments totaling 103,528 acres. The permittee grazes 4 bands of almost 2000 sheep per band across these allotments. The Permittee has been grazing these allotments for more than 30 years and has experienced numerous losses due to predators, mainly wolves over the years. Each band of sheep has at least one herder, but in some situations has two herders per band, which would be accompanied by several herding dogs. Each band of sheep will also have several guard dogs that would stay with the sheep 24 hours a day (photo 8).

Photo 8. Guard dog to protect sheep (credit USDA-WS)

The main herder has been with this permittee for over 40 years and has extensive knowledge of predator locations, denning and collision sites. This helped the range rider immensely with being able to get put themselves between the predators and flock to help detour conflicts.

Allotments and permittees:

The 8 forest allotments were all permitted to the same livestock producer. There is only one point of contact for the permittee, who is easy to work with and has years of knowledge about the area which helped with communications and coordination. The allotments are spread out across the Payette National Forest and the 103,528 acres covers about 372 square miles of terrain made up of high peaks, ridges, and river canyons with very few miles of roads accessing these areas. Most travel is on horseback or foot with some trails that access areas utilized by the permittee. Generally, the permittee has 3 bands of ewe/lambs in the northern allotments and keeps his bucks in a separate allotment, which is in the southern end of his permitted area.

Communications-preplanning:

The program started with a meeting between the range rider and the sheep foreman in the field where they discussed historical conflict areas, where, and when the sheep would be moving. A few weeks before the range rider started work, the permittee had lost a guard dog to a pack of wolves, in an area which historically has a lot of conflicts with depredations. The range rider contacted local sportsman in the area and talked with them about what they had been seeing and hearing. They stated that they had picked up some photos on their game cams of wolves and cougars. They would not share the photos, but indicated they had also heard wolves howling at night. The band of sheep was moving out of the area in the next few days and moving towards another allotment on the other side of the drainage. The foreman or the sheep producers was notified to what the sportsman had said, and the herders were also notified for the possible contact with wolves in the area. The range rider then moved into the allotment ahead of the band and was a presence for 2 days prior to the sheep moving in. Communications with the foreman was constant and daily for the first week or so. The range rider and foreman looked over maps and the foreman shared his history and concerns with predator encounters in areas they were moving into. These were noted on the map and identified as points of concern.

Season activities:

As the bands moved through the allotments the range rider would spend time in the known conflict areas to look for signs of predator activities. He would then have a presence in those areas as the sheep moved about. In the area where the guard dog was killed by wolves is an area where they have conflicts regularly. Another area where wolves tend to leave one drainage to access the sheep as they move through, there is a suspected wolf den site that was pointed out and investigated. No wolf sign was found at this site. One cougar was located and extra efforts to prevent conflicts were taken in this area for a few days. The cougar was around the sheep but never caused any issues – she was located following a small herd of elk and there was one elk located that had died and been eaten. We suspect it was this lion that killed it, but it left the area without incident and was not seen again (Photo 9).

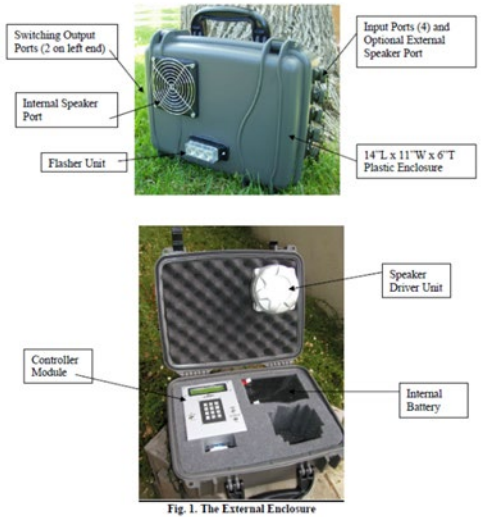


Fig. 1. The External Enclosure

At this time the band of bucks at the southern allotment had a pack of wolves frequenting the area, howling, and making a lot of noise near the band. The range rider shifted his focus to that area and went up and met with the herders in camp. They showed where the wolves were the night before and planned to set up a RAG box in the drainage between the band and the upper end of the drainage where the wolves were (Photo 10). The RAG box was picked up 2 days later as the band was moving across the drainage and away from the pack. A few days later the wolves had followed the pack down to the bottom of the drainage and were seen running up and down a hiking trail used by recreationists and the herders.

The range rider loaded up a mule and took a RAG box and trail cameras up the trail and placed them between the band and the wolf den and left them until the band moved on a few days later (Photo 11). The RAG box was programed to start at 10pm with the sound of an airplane buzzing for 30 seconds, then immediately after, 30 seconds of gunfire, then off for 14 minutes then repeat. This series was changed up every couple of hours with firework sounds or trains, etc. The plan was to keep the noise up in the area to keep the wolves away. The game cameras only picked up deer, domestic dogs, and hikers, but no predators. This strategy was a complete success at preventing a potentially large conflict.

Over the course of a few weeks, the sheep slowly moved to the shipping corrals where the lambs were shipped to market. After a few days, the ewes would be moved back to the forest allotments, where the range rider spent a few days riding the area prior to the sheep arriving. There were wolf tracks found at a water hole and a

game camera was set up and retrieved after 3 days. No predator photos were found on the game camera. The band then moved on without any issues.

Summary:

This was a short season of only 19 days of field work, we started late in the season, which gave the range rider and the foreman time to get to know each other and work together. Several hours were spent looking over the maps and identifying how the bands move through the area and locations of historical conflict sites. This will be a great help in making plans for next season as the range rider will have this seasons' experience to capitalize on. This experience will help the range rider get ahead of the bands and focus on conflict areas and presumably be able to head off any conflicts with predators. Setting up the RAG boxes and game cameras was learned this year and should now be done more efficiently with better results.

Fladry Projects On Private Property:

As mentioned above, turbo fladry is an electrified wire fence that has 18-22in., red flags attached that blow in the breeze. This electrified fencing is great for small, enclosed pastures where livestock are being temporarily kept. WS in Idaho is primarily using turbo fladry for the protection of livestock from wolves. In many situations in Idaho, livestock are in small, enclosed pastures during winter months when they are being fed hay and are calving or lambing. Newborn calves and lambs are vulnerable to depredation by all predators, but with turbo fladry, protection from wolves can be very successful. Ideally, the fladry is installed on the outside of a permanent fence. This protects the fladry from livestock pulling on the flags, but also deters a wolf before it gets into the permanent enclosure (Photo 12).

Photo 12. Calf protected inside turbo fladry fencing in Idaho (Credit NRDC)

In the winter of 2021, WS and with the help of the Natural Resource Defense Council (NRDC) installed 4,300 yards of turbo fladry in Idaho. This encompassed two different pastures, which totaled approximately 134 acres. This project was for the protection of cattle from wolves. The location of this project is close to the Sawtooth National Forest and the Salmon/Challis National Forest. Additionally, this area is where some deer and elk spend the winter. If necessary, wolves will follow deer and elk to their wintering grounds and stay there until next spring. In some situations, this will bring wolves into proximity to wintering livestock too.

Livestock on this property stay in this location throughout much of the year, including winter months where they are fed hay and cows give birth to their calves close to the ranch headquarters. With wolves close by, and newborn calves in pastures, conflicts are almost inevitable. Efforts to prevent conflicts in these situations can be addressed by using turbo fladry. With the efforts of several WS employees, and a NRDC employee, fladry in one location was installed (Photo 13).

Photo 13. WS employees and NRDC employee BBQing at a fladry project (credit USDA-WS)

Fladry is not designed to be a permanent fence. All animals, including predators will habituate to the fencing and it will lose its effectiveness over time. With a maximum of 3 months after installation, the fladry will be removed. This will help ensure the effectiveness over long periods of time on this property. The fladry is easiest cared for if it's rolled up on large rolls. It can be unrolled and reinstalled with greater easy too (Photo 15). With this type of care, the fladry can be reused for several years.

Photo 14. Cattle protected within a fladry fence (credit NRDC).

Over the course of this 12-week project and winter, no livestock were killed or injured by wolves. There were wolf tracks found several times within proximity of the pasture, including wolf tracks going down the road up to the fladry.

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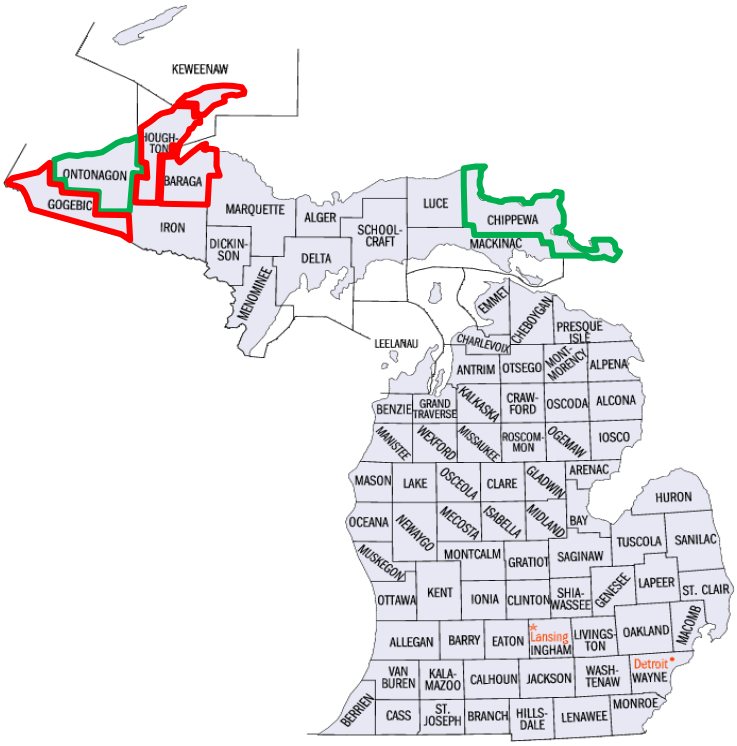
MICHIGAN

2021 Michigan Non-Lethal Large Predator Control
Wildlife Services, MI DNR

Introduction

For the 2021 season Wildlife Services assisted 8 cooperators with large predator non-lethal control. These were in collaboration with MI DNR. Non-lethal control can be an effective tool in reducing conflicts between livestock owners and large predators. The livestock concerned included chickens, cows and calves, and sheep at operations ranging from small hobby farms to some of the largest cattle farms in the U.P. of Michigan. Depredations of chickens this year were associated with coyotes only while depredations of calves were caused by both coyotes and wolves. Non-lethal cooperators are in Ontonagon and Chippewa Counties, outlined in green on the map below. Outreach efforts included speaking with 8 other potential cooperators from Gogebic, Houghton, Keweenaw, and Baraga Counties, outlined in red on the map below.



Methods

Cooperating farms were monitored with trail cameras and accessed prior to installing non-lethal equipment. Historical radio-collar data (MI DNR) was analyzed to help determine large predator travel routes and determine the placement of equipment. Non-lethal installations started in May and some applications were still in effect beyond October. Methods included the use of fladry, LED solar-powered lights, solar-powered stereos, and trail cameras, along with range rider type monitoring were used at most farms. Equipment was moved frequently with livestock to new pastures and as trail camera data and other evidence showed where predators were travelling. Fladry was installed around occupied pastures in open areas where it could be seen by predators and was likely to work. Flashing lights (LED solar) were used in areas fladry would not work because of brush or topography or in combination with fladry. The lights could be placed inside occupied pastures and, at times, were visible up to ½ mile away.

Lights spaced at a minimum of every 100 ft seemed to work well, however, they only activate at night. A solar-powered stereo was used in several locations on farms and could be programed to play during periods of expected predator activity. Stereos were placed at areas that were most important to keep predators out. It became evident that for coyotes it needed to be on 24 hours a day since they were taking chickens during mid-day.

Non-Lethal Efforts and Results

Table 1. Cooperators 2021 Michigan. Livestock, Acres, Non-lethal efforts.

Farm	Livestock	Amount	Non-L acres	Total acres	Pastures	Duration	Daily visits	Field hrs
1	Chickens	6	3	40	1	30	3	4
2	chickens	6	2	40	1	24	3	4
3	chickens	12	6	120	2	98	25	33
4	Cow, calf	30	30	80	2	110	28	22
5	Cow, calf	90	175	340	10	150	47	94
6	Cow, calf	300	713	1600	12	180	72	115
7	Sheep	350	0	610	10	30	1	4
8	Cow, calf	250	0	1200	6	32	10	28
Total		1044	929	4030	44	654	189	304

In summary, a total of 7,150 yards of fladry (see Appendix Photos) was installed between 3 cooperators, all with beef cattle. It was moved from pasture to pasture as livestock moved. Fourteen thousand one hundred and ninety-seven (14,197) yards of LED lights were used at 6 cooperators, solar-powered stereos set up 18 times at 4 farms (see Appendix Photos), and trail cameras set up in 255 locations at all 8 farms. This was to cover about 929 acres located in 44 different pastures on 4,030 acres of farmland. Non-lethal methods were installed to protect about 730 head of beef cattle and calves, 215 sheep, and 30 chickens for a period of 654 total farm days. This included about 189 daily visits, 304 field hours, and 179 range miles walked.

Non-lethal methods were utilized from May through September, with some continuing into FY2022. All available equipment was out for 10 weeks during Spring/Summer calving season (Table 4 and Table 5).

Table 2. Cooperators 2021 Michigan. Non-lethal range riding and equipment

Farm	Livestock	Range miles~	Fladry Yards	Lights Yards	Stereo Set up	Cameras	Camera location
1	chickens	1	0	317	0	2	3
2	chickens	1	0	217	0	1	1
3	chickens	28	0	410	1	2-6	42
4	Cow, calf	16	367	1,010	1	1-6	34
5	Cow, calf	28	1,950	4,930	6	2-6	68
6	Cow, calf	84	4,833	7,313	10	1-7	128
7	Sheep	2	0	0	0	7	7
8	Cow, calf	19	0	0	0	2-5	14
Total		179	7,150	14,197	18		255

A combination of installing fladry, lights, stereos and checking cameras, along with range riding (walking and surveying pastures) helped deter depredations at all farms. This also aided in identifying depredations and other natural caused mortalities so carcasses could be disposed of. During the season, 2 stillborn calves were located along with several carcasses from the previous winter that needed to be disposed of. Twelve depredated chicken carcasses were located along with one coyote killed calf and one that had been attacked but survived. Six different wolf-killed calves were documented. Wolf scats containing cow and sheep hair were also located, and one wolf den and rendezvous site located.

Table 3. Cooperators 2021 Michigan. Non-lethal predator control results.

Farm	Livestock	Predators Detected	Predators inside pasture	Depredations during	Notes
1	chickens	coyote	coyote	1*	Chickens removed eventually
2	chickens	coyote	coyote	3*	Chickens removed eventually
3	chickens	coyote	coyote	2*	1 dep first day and 1 near end when stereo stopped working
4	cow, calf	coyote, wolf	none	0	No pred sign in pasture during non-lethal
5	cow, calf	coyote, wolf, bear, bobcat	coyote	0	A few coyote pics in pasture, no wolves or sign during non-lethal
6	cow, calf	coyote, wolf, bear, bobcat	coyote, wolf	8**	Non-lethal was effective for some time. depredations occurred when calves moved further from farm.
7	sheep	coyote, wolf	N/A	N/A	Monitoring, surveying for spring set up
8	cow, calf	coyote, wolf, bear	coyote, wolf	1***	Monitoring to be sure wolf left pasture, it eventually did but returned to kill one compromised calf.

*These farms lost a total of over 70 chickens before non-lethal efforts started.
**7 wolves, 1 coyote, (also 4 wolf depredations during period after non-lethal was removed)
***occurred after work ended at farm and non-lethal was not set up.

Judging from trail camera photos, tracks and sign, the large predators were avoiding areas where non-lethal methods were used. Coyotes did seem more likely to enter protected pastures than the wolves and were detected by cameras and tracks inside pastures at more farms than wolves were. There is a descriptive series of trail camera photos of a wolf turning back on a trail after he sees the non-lethal methods (see Appendix Photos). First, he sees the fladry and pauses, then takes a few more steps and at that point he can see the LED lights and can hear the stereo in distance. This appears to be too much, and he turns and heads back in the direction he came from. On this farm and a neighboring one there was no evidence that wolves entered the pastures with non-lethal equipment, however once it was down when pastures were switched, they would then travel through, but no problems occurred.

Sixteen depredation events were investigated on 8 different farms (Table 3 and Table 4). On one cattle farm, depredations by wolves seemed to be associated with wolves feeding on carcasses not properly disposed of. These depredations occurred inside areas where non-lethal methods had been

deployed. Wolves repeatedly fed on poorly buried carcasses withing site of fladry, lights and stereos and in sight of calves, becoming desensitized to non-lethal methods eventually. Eight wolves in total were removed from the farm (6 with MI DNR issued permits, 2 by WS). The first wolf to be removed under MI DNR permit (by the landowner) was the lactating female of the pack, which may have upset the pack dynamics enough to trigger depredation activity.

The farms with coyotes depredating chickens had mixed results. These farms had lost over 70 chickens before non-lethal efforts started. The coyotes had started taking chickens in middle of the day so the only viable tool became the solar-powered stereo since fladry could not be set up in the areas. Some coyotes were removed by landowners which, in combination with the stereo, slowed depredations.

The sheep farm that work was initiated on in late in FY21 had non-lethal assistance many years ago but recently has suffered significant losses to lambs over the last 3 years by unknown predators, despite guard dogs having been present. Work there was focused on monitoring the farm and preparing a plan for lambing season in the Spring of 2022.

Since these non-lethal methods seem to work for only so long, it seems that it's very important to identify what period and duration of time to use them, otherwise the predators become accustomed to seeing them and they lose effectiveness. The longer they are installed the less effective they become. Therefore, monitoring cooperating farms and deciding when exactly to install each component as well as when to remove them is very important.

Table 4. Michigan 2021 Non-Lethal Summary Table

Type of Project	# completed in FY21	# of cooperators served	Any additional notes
Fladry	21	3	7,150 yds (~1,100 acres)
Range riding	26	8	~185 hrs/~3,200 acres
Permanent fencing	N/A	N/A	N/A
Electric fencing	1	1	150 yds (Carcass disposal site)
Dog placement	N/A	N/A	N/A
Harassment	11	3	Evening wolf and coyote deterrents
Visual and/or audio deterrents	26	18	6 visual/4 audio 14,197 yds (~1,300 acres 18 audio set-ups
Outreach Events	8	8	Talking with area producers
Technical Assistance	N/A	16	
Depredation Investigations	16	8	5 submitted paperwork to MI DNR

			for loss reimbursement

Other (please specify) Trail camera monitoring		8	255 camera locations

Total	129	65	16 farms, 8 signed up as cooperators (6 new for 2021

Table 5. Non-Lethal Equipment on Hand for Loan/Use on Cooperator's Farms

Type of Equipment	Amount	Comments
Fladry/Turbo Fladry	1,450 yards	~125 posts and insulators
LED solar predator guard lights	94	From multiple vendors all are flashing red LED lights that activate at night
Solar powered stereos	3	Manually operated not remote activated
Trail cameras	8	Remote activated, non-cellular

- Equipment was deployed for about 210 days from Spring through Fall to address various needs.

- 100% of available equipment was deployed during calving season (70 days) from 5/17/21 through 7/26/21 on multiple farms.

An increase in equipment would allow for more participation by producers. Doubling the amount of equipment on hand is likely needed to satisfy anticipated requests for service in 2022. Cameras are in high demand followed by solar powered stereos, solar powered lights and fladry. Total cost for additional equipment would be approximately $4,000 including:

-Electric fence and solar chargers are needed as all of what was available was provided by employee
-Cooperators supplied some of their personal or MI DNR owned solar, or battery powered lights, n = 50.

Financial expenditures for one full-time employee and supervision in 2021:

- 80% – Salary/benefits
- 19% – Supplies
- 1% - Travel

Summary

All Cooperators seemed satisfied with non-lethal assistance, and most will continue for 2022. It should be noted that all of these farms also use lethal force when allowed to by permit and appropriate. The fact that some of these non-lethal methods can do some good 24 hours a day seemed to be the

main reason these farms decided to try it. These 8 cooperators' general goal is to reduce depredations and they have been open to trying different methods. The cooperators with coyote depredations had significant losses before non-lethal actions started and while non-lethal seemed to help somewhat, it was not a complete solution to the coyote depredations. However, if non-lethal efforts had begun before significant depredations occurred, they may have had more of a positive effect. At the farm with the beef calf depredations, poor carcass disposal combined with lethal removal of the lactating female with pups still dependent on her likely contributed to depredation problems. Large predators (wolves) regularly visited carcass sites and eventually began taking calves after the female was shot. There were no calf depredations at cooperators with adequate carcass disposal. Good scouting and proper installation and moving of these methods with livestock was essential for success. Although some cooperators have had non-lethal assistance in the past but eventually were not satisfied with it, possibly due to the loss of effectiveness over time, we were able to prove some success using these methods. With the anticipation of more producers seeking assistance, additional non-lethal supplies could be utilized in the upcoming 2022 season. Searching for new methods to turn predators away and monitoring situations will be essential for long-term success.

Appendix photos

Fladry

Stereo in tree stand

Solar Stereo in abandoned barn

Wolf traveling game trail through one pasture into another with calves


STEALTH CAM
04:37AM
06/09/21


STEALTH CAM
04:38AM
06/09/21


STEALTH CAM
04:38AM
06/09/21


STEALTH CAM
04:39AM
06/09/21

Had enough and leaves


STEALTH CAM
04 : 39AM
06 / 09 / 21

MINNESOTA

FY21 Minnesota WS Non-Lethal Activities

Figure 1. Wolf Leaving Turbo Fladry-Protected Calving Pasture. (St. Louis County, MN)

Introduction

Figure 2. Wolf Investigating Newly Installed Turbo Fladry. (St. Louis County, MN)

The USDA Wildlife Services program in Minnesota has always incorporated a non-lethal component in its wolf depredation management practices. In 2020, however, funding became available to invest in a dedicated non-lethal wolf depredation management program that would operate in conjunction with the existing wolf depredation management program. The Non-Lethal program was intended to help provide livestock producers and pet owners experiencing wolf problems a non-lethal option to help prevent, or at least minimize, losses due to wolf depredations. Prior to 2020, Minnesota Wildlife Services (MNWS) personnel had limited options available in responding to requests for assistance where wolves were present, but hadn't caused a verifiable loss, such as killing or wounding livestock or pets. With the initial non-lethal funding in 2020, MNWS was able to hire a fulltime seasonal specialist, as well as purchase equipment, such as fladry, to deploy in instances where wolves were present, but hadn't caused verifiable damage that warranted lethal removal of the wolves. *Per Appendix A.*

The busiest part of the wolf depredation season in Minnesota typically runs from April to November. MNWS's Northern District's Non-Lethal Wolf Specialist worked through their second wolf depredation season as a full-time, year-round employee. Most of the position's duties are done alone. (Ex: Installing fladry in areas less than 80 acres or responding to complaints of wolf sightings near livestock or pets). In some instances, the assistance of seasonal employees is necessary when the employees are available outside of their regular duties. During FY 21, five employees assisted in five projects that were charged to our Non-Lethal Initiative. Of the employees that assisted in our Non-Lethal work, two of them are seasonal Wildlife Specialists, one full-time staff biologist, one District Supervisor, and one volunteer employed by the Minnesota Conservation Corps. Everyone that assisted in these projects worked a handful of times whenever they were available over the course of our wolf depredation season. Assistance was needed most when building a permanent woven wire fence in northern St. Louis County. Other than the permanent fence, assistance was needed for six days total at four separate locations in northern Minnesota when retrieving fladry from the field.

Figure 2. WS Staff Working with Producer to Install Permanent Fence. (Sheep Ranch, St. Louis County)

At the height of our busy season, we had 6.5 miles of Fladry/Turbo Fladry (92% of available), 22 trail cameras (57%), and 5 electric fence chargers (71%) deployed in the field at one time. These materials were being used primarily in conjunction with fladry sites, with the exception of 6 trail cameras being used to monitor our ongoing permanent fence install. We worked with 16 different cooperators in FY 21, 10 of which were new cooperators.

Type of Project	**# completed in FY21**	**# of cooperators served**	**Any additional notes**
Fladry	13	10	10/13 Turbo Fladry
Range riding	-	-	-
Permanent fencing	1	1	5 miles completed
Electric fencing	-	-	-
Dog placement	-	-	-
Harassment	-	-	-
Visual and/or audio deterrents	-	-	-
Outreach Events	-	-	-
Technical Assistance	N/A	3	Camera traps deployed- No preventative action taken.
Depredation Investigations	11	11	-
Other (please specify)	-	-	-
Total	25	25	N/A

Financial Breakdown of FY 21 Funding:

Salary: 58%

WEX gas: 7%

Supplies/equipment: 31%

Travel: 4%

Large purchases:

ATV tracks: $4,250

Fladry: $9,900

2’ Woven wire fence apron: $1,930

Trailer: $3,810

Trail cameras: $2,375

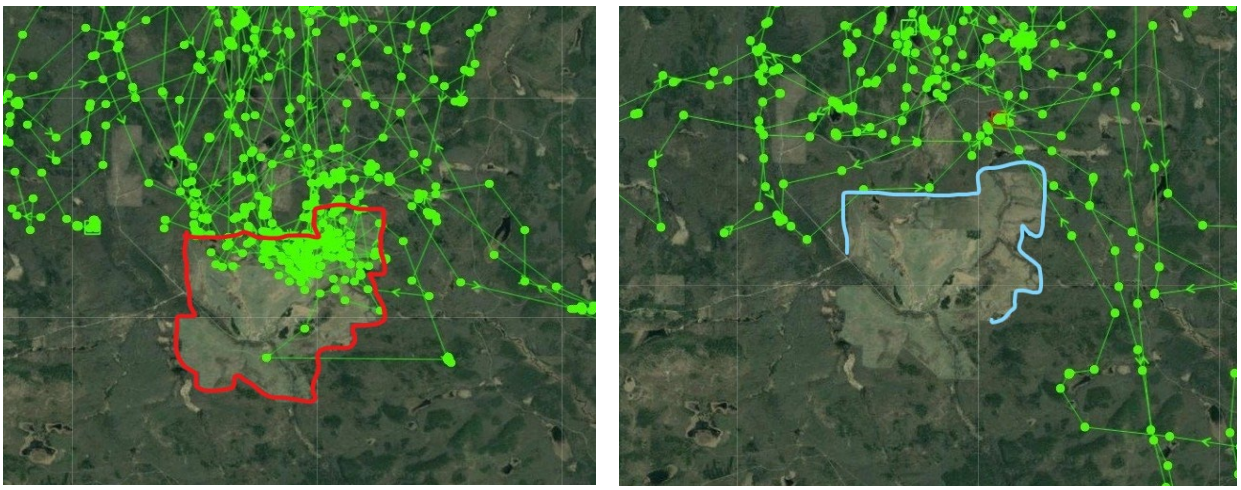
Sheep Ranch

Figure 4. Radio Activated Guard Box; Shown Ineffective at Deterring Radio Collared Wolves. (Sheep Ranch, St. Louis County, MN)

Since the 1980s, the ‘Sheep Ranch,' a family owned and operated beef cattle operation in northern St. Louis county, MN has raised cattle surrounded by a landscape of excellent wildlife habitat. The Sheep Ranch has, and continues to, sustain high levels of wolf depredations annually, despite employing a variety of non-lethal management techniques such as range riding, turbo fladry and a Radio Activated Guard box, which have shown to be relatively ineffective. Due to this, wolves are killed each year for depredation management. The ranch is the nexus of four different wolf packs that all occasionally use the Sheep Ranch. The Sheep Ranch constitutes 0.3% of the Greater Voyageurs Ecosystem and yet is the source of ~10% wolf mortality in the Greater Voyageurs Ecosystem. As a result, this one location has been the site of at least 15 confirmed cattle depredations from 2002 to YTD 2021 and ~3-4 times that many missing yet unconfirmed. Since 2002, 83 wolves have been lethally removed from this location. The cost of these livestock losses paid by the Minnesota Department of Agriculture (MDA) ($17,550), wolf removal efforts ($33,169) and producer implemented non-lethal measures ($20,000) over that time is $70,719. Stakeholders (Voyageurs Wolf Project, MN DNR, USDA-APHIS-Wildlife Services, NRDC, MDA, ranch owner/operators) agree that conflict prevention is the most effective, long-term solution.

Figure 5. A Wolf/Cattle Interaction One Week After Turbo Fladry Install. (Sheep Ranch, St. Louis County, MN)

During the spring of 2021 with support from the National Wildlife Research Center, University of Minnesota Voyager's Wolf Project, MDA, and the Sheep Ranch's Owner/Operator, Minnesota Wildlife Services' Non-Lethal program was able to start construction on a permanent woven wire fence with a 2' ground apron around the perimeter of the Sheep Ranch's 1600-acre property. Ground was broken in June of 2021, and by August of 2021 MNWS, with the support of the Voyager's Wolf Project, had completed four of the seven miles required to complete the fence. In the two-month period of fence building, Voyager's Wolf Project's GPS collar data showed evidence of the permanent fence working. Reducing the movement of the radio collared wolf pack residing north of the Sheep Ranch.



The Sheep Ranch reported verified wolf damage in the spring of 2021 and MNWS removed one wolf prior to the permanent fence installment. Since the fence has been installed, no damage has

been reported. Winter weather conditions have stopped our work on the fence for the season, five miles of standing 4' and 6' woven wire fence as well as 2' ground apron has been installed to date. The remaining two miles of the fence will be installed when weather conditions are suitable. WS has continued monitoring wolf activity with camera traps until work can continue in the Spring of 2022.

See attached letter of support from University of Minnesota-Voyager's Wolf Project. Appendix B.

Figure 8. Radio Collared Wolves Outside of Permanent Fence. (Sheep Ranch, St. Louis County, MN)

Aitkin County

In April 2021, MNWS received a complaint from a producer with historic wolf damage on their property. The producer reported multiple wolves sighted near their calving pasture. WS investigated the complaint and found that the wolves were feeding on a cow carcass that was improperly disposed of. The producer was advised to destroy the carcass to displace the wolf pack on their property.

Figure 9. Wolf Pack Feeding on Cow Carcass Near Calving Pasture. (Aitkin County, MN)

Figure 10. Wolf Howling Near Turbo Fladry. (Aitkin County, MN)

Wildlife Services responded by installing Turbo Fladry around the perimeter of the calving pasture as well as multiple cameras to monitor wolf activity. Wolf activity continued throughout the longevity of the calving season. We observed almost daily activity from the wolf pack in the area for two months. No damage was reported by the producer in 2021.

Figure 11. Wolf Carrying Hind Quarter of Cow Carcass Next to Calving Pasture. (Aitkin County, MN)

Conclusion

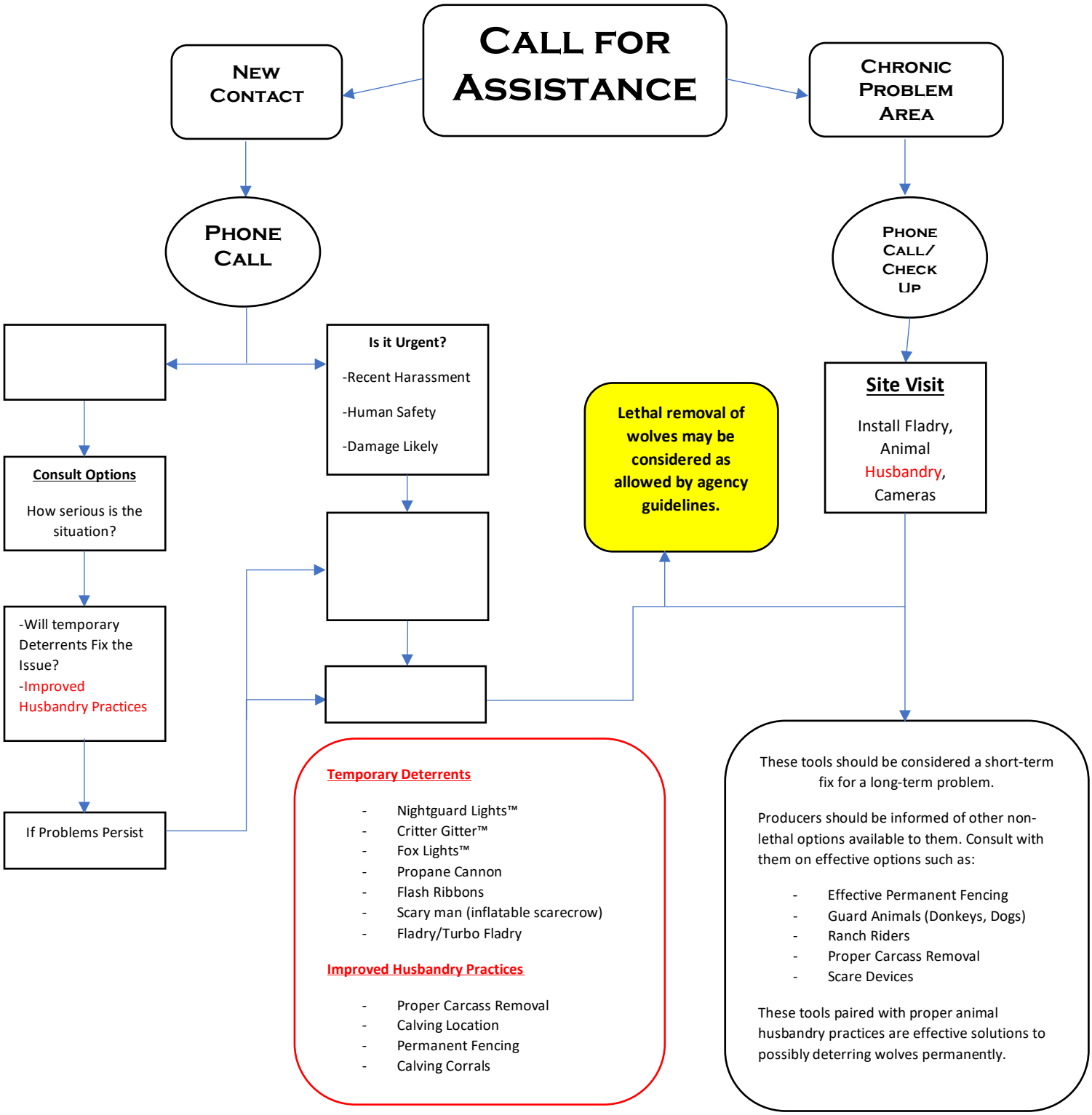
In the two years that MNWS's Non-Lethal Program has existed, we have not had any wolf damage reported inside Turbo Fladry or where preventative measures have been taken. This program has been very beneficial to our program as well as our producers. Our conflict prevention program has been crucial in being able to assist anyone with wolf conflicts, regardless of verified damage. This has allowed us to reach a broader group of concerned individuals within Minnesota. We now have the tools, as well as the evidence to show cooperators that there are preventative measures that can be taken to aid in wolf-livestock conflict before damage has

Figure 12. Cow and Wolf looking at one another outside of Turbo Fladry. (Aitkin County, MN)

occurred. This program has given MNWS the tools needed to help a larger group of people while keeping livestock and wolves safe at the same time. MNWS plans to complete the Sheep Ranch fence in 2022 as well as initiate a pilot community carcass disposal. With the relaxation of Covid-19 protocols, to allow in person meetings, we look forward to reaching more producers in 2022.

For more information contact: Jack.Morawczynski@usda.gov or John.P.Hart@usda.gov

APPENDIX A: MINNESOTA NON-LETHAL WOLF COMPLAINT PROTOCOL



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To Whom It May Concern:

The Voyagers Wolf Project is a University of Minnesota research project studying the ecology of wolves in the Greater Voyageurs Ecosystem (GVE), a ~2,000 km^2 boreal ecosystem in northern Minnesota. I lead the Voyageurs Wolf Project and have studied wolves in the GVE for 8 years.

Nestled in the middle of the GVE is a large 1500-acre cattle ranch (called "The Sheep Ranch") run by the Johnson Family. The Johnson Family has had persistent wolf depredation issues for years and our work on the Voyageurs Wolf Project has provided some clarity as to why: the ranch sits at the nexus of 3-4 wolf packs depending on the year.

In 2020, we started working with USDA Wildlife Services and the Johnson Family to figure out a solution to this seemingly endless wolf-livestock conflict. After in-depth discussions, we all agreed that a fence was the best solution

By early 2021, each partner had secured funds from different sources to cover fencing supplies. And while this was a big success, the real work was just beginning. The perimeter of the Sheep Ranch is 7.5 miles and it was clear that an immense amount of effort would be needed to install the fence.

In June 2021, we broke ground and fence installation had started. This is when the partnership between Wildlife Services, the Johnson Family, and our project became crucial. Because there were no funds to pay a contractor or other entity to install the fence, our three groups had to figure out how to complete the project and install the fence ourselves. And we did.

The Johnson Family installed new fence posts, fixed and cleared fence lines, provided and maintained large equipment for fence installation; Wildlife Services staged fencing around the ranch, and installed, stretched, and secured the fence, and our project cleared fence lines, stapled the fence installed by Wildlife Services, and installed the apron fencing along the outside of the fence line. Of course, this is a brief and simplistic description of each partner's contributions and is simply intended to 1) illustrate the collaborative and synergistic nature of this project, and 2) make clear the significant logistical and financial investment from each partner.

Through this collaborative effort, we were able to install 5.5 miles of fence this year and will finish installing the remaining 2 miles next year before the grazing/calving season. The most encouraging aspect of this project is that the fence appears to be working. The Voyageurs Wolf Project had GPS-collared wolves in two packs surrounding the Sheep Ranch this year and the installed fence was impeding and altering these wolves' movements. Thus, all signs suggest that this non-lethal approach will be successful in ending a long-term wolf-livestock conflict and we are optimistic that it will be a premier example for how to resolve similar conflicts across Minnesota.

Sincerely,

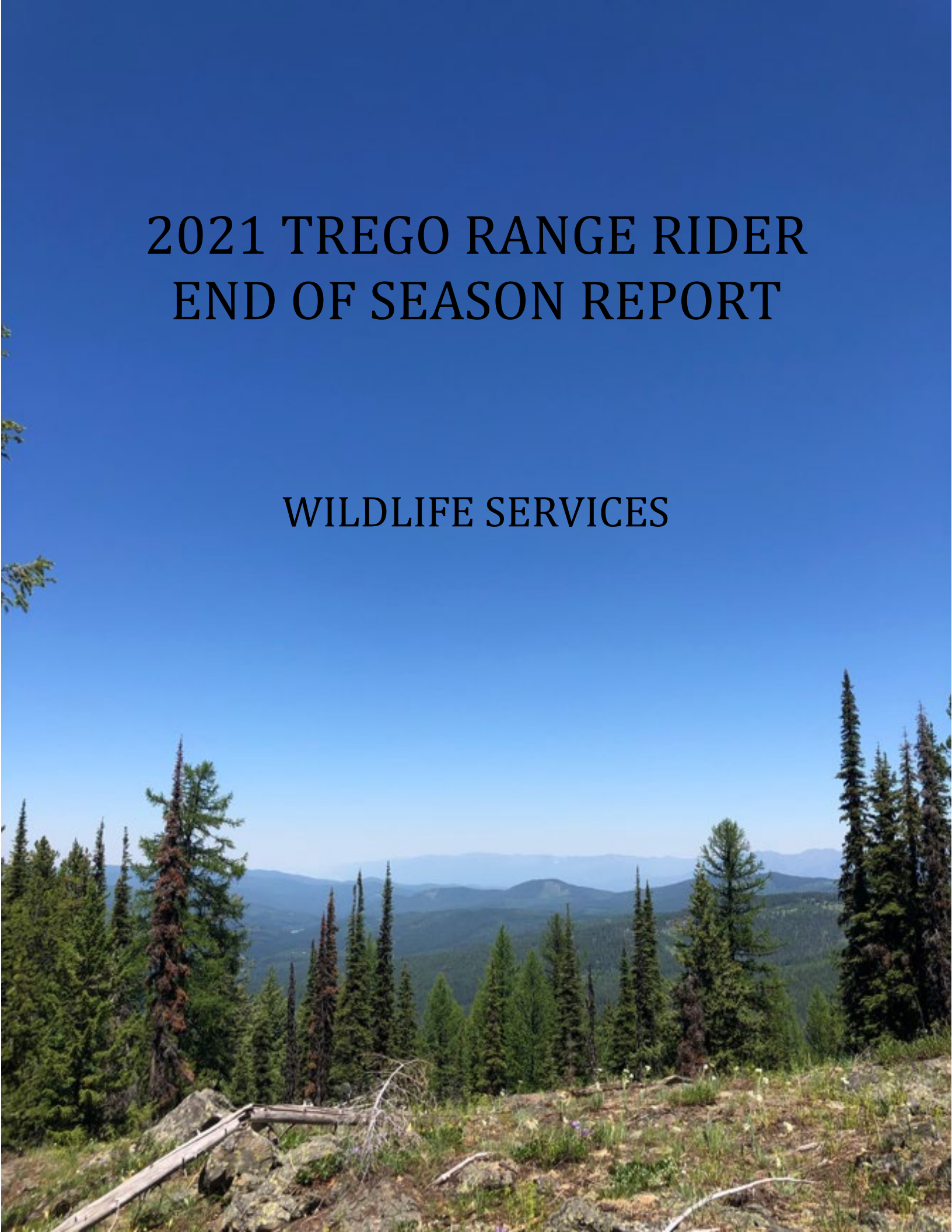
Tom Gable

Project Lead, Voyageurs Wolf Project
Ph.D., University of Minnesota

MONTANA

2021 TREGO RANGE RIDER END OF SEASON REPORT

WILDLIFE SERVICES



I. Introduction

Returning for its fourth year in the far Northwest corner of Montana, the Trego Range Rider resumed the seasonal role of reducing predator-livestock conflicts on cattle grazing allotments in the Kootenai National Forest. The purpose is wide: monitor livestock health and observe predator activity to communicate to livestock producers, provide a human presence to deter and reduce carnivore-producer losses, and quickly locate carcasses to determine cause of death. The Trego Range Rider position is a collaborative program involving Natural Resources Defense Council (NRDC), Defenders of Wildlife, Greater Yellowstone Coalition, Vital Ground, Sierra Club, USDA APHIS Wildlife Services, United States Forest Service (USFS), Montana Fish, Wildlife and Parks (FWP) and seven livestock producers. Between the end of May to early October, five allotments and one state lease were travelled by horseback, truck, ATV, and hiking to encourage carnivore coexistence.

II. Background

The Kootenai National Forest is 2.2 million acres of extremely timbered, dense habitat – home to black and grizzly bear, mountain lion, gray wolf, and for the summer season, range cattle. The permitted allotments are located within the Salish mountain range and cover old and new logging units, small varying meadows, and old growth forests.

The Kootenai is packed with human history – the Salish, Kootenai, and Nez Perce tribes frequented the landscape over 8000 years ago. European explorers moved into the area in the 19th century and began mining and fur trading. Railroads and logging came to the region at the turn of the century and much of the public forest today is comprised of old timber hauling roads. The CCC also lent a hand to building much of the infrastructure within the Kootenai.

The Trego Range Rider Program's allotments date back to the early 1900's – permitted grazing in the Kootenai and on USFS lands offers fundamental sources of feed for livestock across the country. The permit holders of 2021 have all largely held their permits for twenty plus years, which proved to be a great asset in learning the country.

The threat of predation is a major challenge for producers dependent on USFS range. The Trego area is habitat to many predators and the Range Rider Program is intended as a non-lethal tool to protect both cattle and wildlife. Other non-lethal predator control methods include livestock-guarding animals, fladry, fencing enclosures, and scare devices.

III. Allotments

There are five allotments within the Trego Range Rider Program that hold seven permits for livestock use: Swamp-Lake Creek, Swamp-Fortine Creek, Pinkham Creek, Trego, and Sunday Creek. Cattle were turned out on allotments in the beginning of June and gathered by the end of September.

Figure 1. Map of Allotments in the Trego Range Rider Program

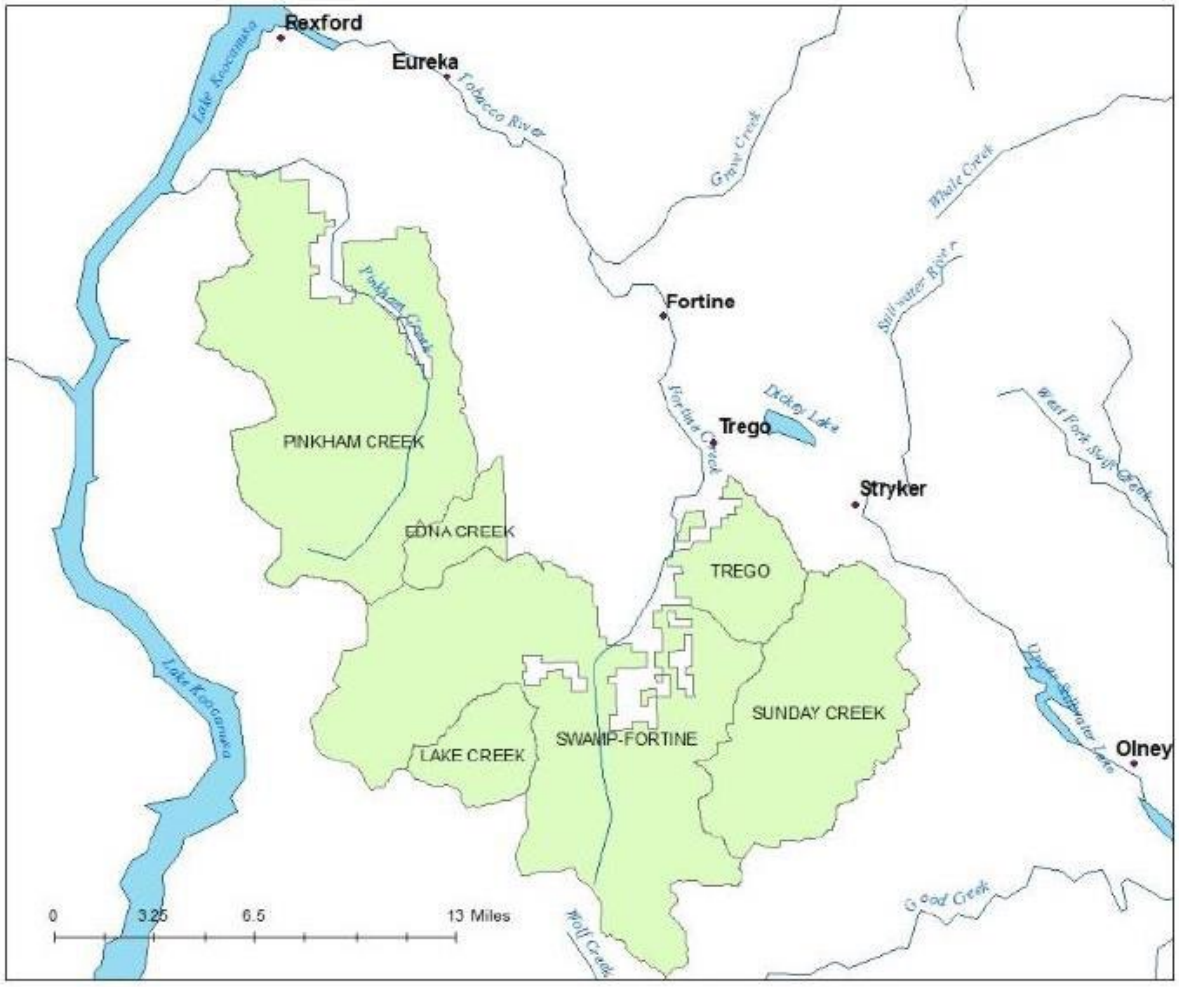


Table 1. Trego Range Rider Program Allotment Information

Allotment	*Total Area Estimation*	*Number of Permittees*	*Number of Cattle*	*Cattle Release Date*	*Cattle Gather Date*
Swamp-Lake Creek	16,000 acres	1	130 pair	June 5	Sept 22
Swamp-Fortine Creek	26,000 acres	1	60 pair	June 14	Aug 20
Pinkham Creek	40,000 acres	2	182 pair	June 2 and June 5	End of Sept
Trego (Lime, Magnesia, Brimstone Creeks)	9000 acres	2	25 pair	June 6 and June 1	Mid Sept
Sunday Creek	26,000 acres	1	50 pair	June 1	Mid Sept
Jim-Stewart Creek (state lease)	2500 acres	1	20 pair	June 7	End of Sept

IV. Orientation and In-Field Work

The season started out by picking up supplies in Helena, attending the spring permittee meeting, and becoming familiar with the allotments and the cattle patterns. The following two weeks of the season were dedicated

to spending a day with each of the cattle producers to learn about the specifics of each range and their cattle, as well as driving the ranges to study the area. In addition, collaborating with Forest Service and FWP officials was very valuable in predator and forest education.

A typical work week included camping at a different allotment every night and moving through the ranges based on predator activity. Camping was done at USFS corrals located on each range and on private property at Grimms Meadow. A daily journal was kept of field observations and daily Range Rider Logs were mailed in every month, along with GPS tracking data and game cameras pictures. Documentation and data entry were critical; data sheets were utilized for the Wildlife Services National Wildlife Research Center (see Appendix).

In order to spend time in each allotment once a week, truck, ATV, and horse were all used to monitor cattle and observe sign. The range rider frequented game trails, cow trails, and gated and barricaded roads to better ascertain the predator and cattle activity.

V. Tools

Throughout the season, several non-lethal tools were utilized that contributed greatly to the overall success of the job. Wildlife Services allocated a truck and ATV to ensure reliable transportation around the ranges. Travelling by horseback was the preferred means of checking cattle on the allotments, due to their relative ease of travel and quietness.

Wildlife Services and USFS together lent a total of 9 game cameras to use for the season – each range was able to have a game camera, as well as

areas that had signs of higher predator activity. Game cameras were largely effective at determining cattle and predator presence. They were moved to locations frequented by cattle and relocated correspondingly to track cattle movement and confirm predator presence alongside cattle herds. Game cameras were placed near water and game trails with fresh sign and checked weekly or biweekly.

A satellite InReach device was utilized to communicate with producers, because most allotments were out of cell service area. A telemetry receiver was also available during the 2021 season, however there were no collared wolves in the allotment area. There was no information about collared bears in the area.

A GPS was used to record tracks and other data. However, early into the season, OnX was determined to be the preferred tracking platform. OnX was also a great asset for its boundary features, which was helpful when land class was in question.

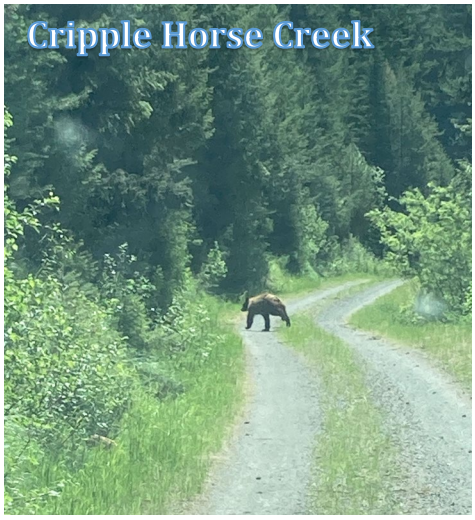
The use of a personal dog was also an incredible asset: finding scent posts, game trails, dirt holes and markings proved to be helpful for placing game cameras and identifying predator activity. Additionally, the dog was able to quickly locate carcasses and old kill sites. Dogs were also useful in deterring predators and contributing a discouraging presence.

VI. Field Observations by Allotment

Swamp-Lake Creek

This allotment has historically had the most depredations of any in the Trego Program; centered around 400 acres of the permittee's private property, the cattle spent the season consistently around the permit holder's large upper meadow. There was considerable wolf sign in the Park Creek, Skelley Creek, and Stirling Creek area at the beginning of the season (early June). FWP Wolf Biologist Wendy Cole set a trap line on Park Creek and the area was avoided until traps were removed.

The Swamp Creek cattle spent the remainder of the season in and around the upper meadow. As the meadow became grazed down, they ventured farther and frequented Grimms Meadow more often towards the end of the season.

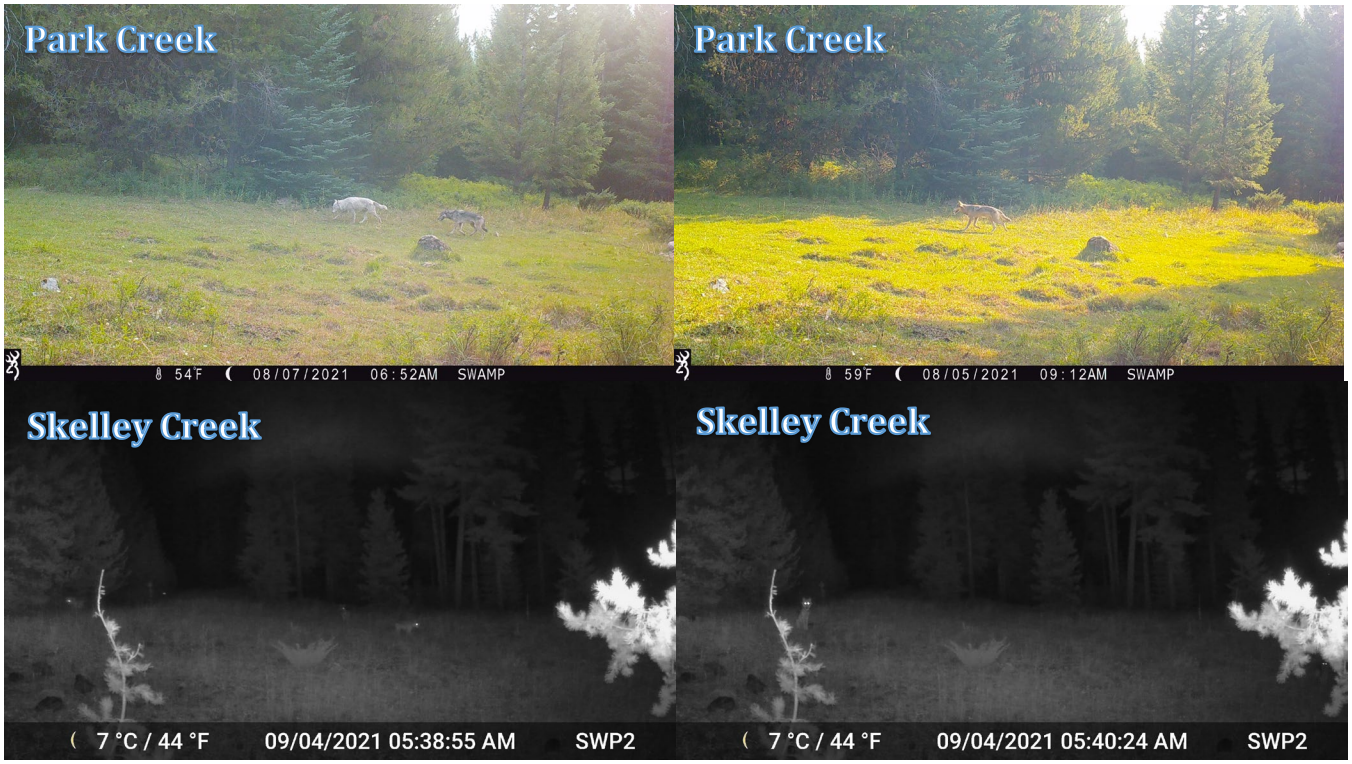


A mountain lion was sighted in Grimms meadow in early June. A juvenile grizzly was also sighted in mid-June in the Cripple Horse area of the range; the producer was notified. The week of July 4, a cow carcass was found on the permittee's private property. The carcass was too scavenged to determine cause of death. The range rider was on leave at the time of discovery and unable to aid in immediate predator detection. The permittee stated that in prior years there had been depredation in the area where the carcass was found.

Wolf sign largely dried up after Cole's trap line was removed, and then picked up again in early August. A deer carcass was found in Grimms Meadow that exhibited signs of a wolf kill. Significant scat sign was found along Park, Stirling, and Swamp Creeks and several wolves were caught on game cameras in the area. There was a sighting of a small female on

Park Creek on August 2. Howling was noticed in Grimms Meadow on August 11: two subadults and one adult that clustered the cattle in the area.

There was minimal predator activity on the allotment through mid-August and mid- September. At the end of September sign and activity began to increase. In 2020, the previous Range Rider discovered a wolf rendezvous point on a Skelley Creek barricaded road (3550C). This area was revisited and had recently been used by wolves, however it is in an area not typically grazed by the range cattle.



Swamp-Fortine Creek

The Swamp-Fortine Creek Allotment encompasses several drainages that all flow into Fortine Creek. A railroad runs adjacent to the creek for most of the allotment. There wasn't a lot of early sign on Swamp-Fortine. As the season progressed more sign was found, primarily concentrated on the Southwest corner adjacent to the Sunday Creek area. The cattle on this allotment preferred to stay low and close to Fortine Creek. However, this area quickly grazed down, and the producers pushed the cattle to Gray Creek on the Southeast side of the allotment. These cattle quickly spread out into bands of 3-6 cow/calf pairs.

On June 22, calf #110 was noticed to be packing its front right leg; the producer was notified. The calf was seen again in late July.

The week of July 4, a calf carcass was found near the Fortine Creek corrals, however it was too scavenged to determine cause of death. On August 19 considerable sign was noted in the Zeller and Gray creek area on road 3507. There were also indicators of a rendezvous point: matted down grass, chewed sticks and trees, bone remnants, and fresh scat. A camera was set to monitor area.

The cattle were gathered in mid-August due to drought conditions limiting water access on the allotment.

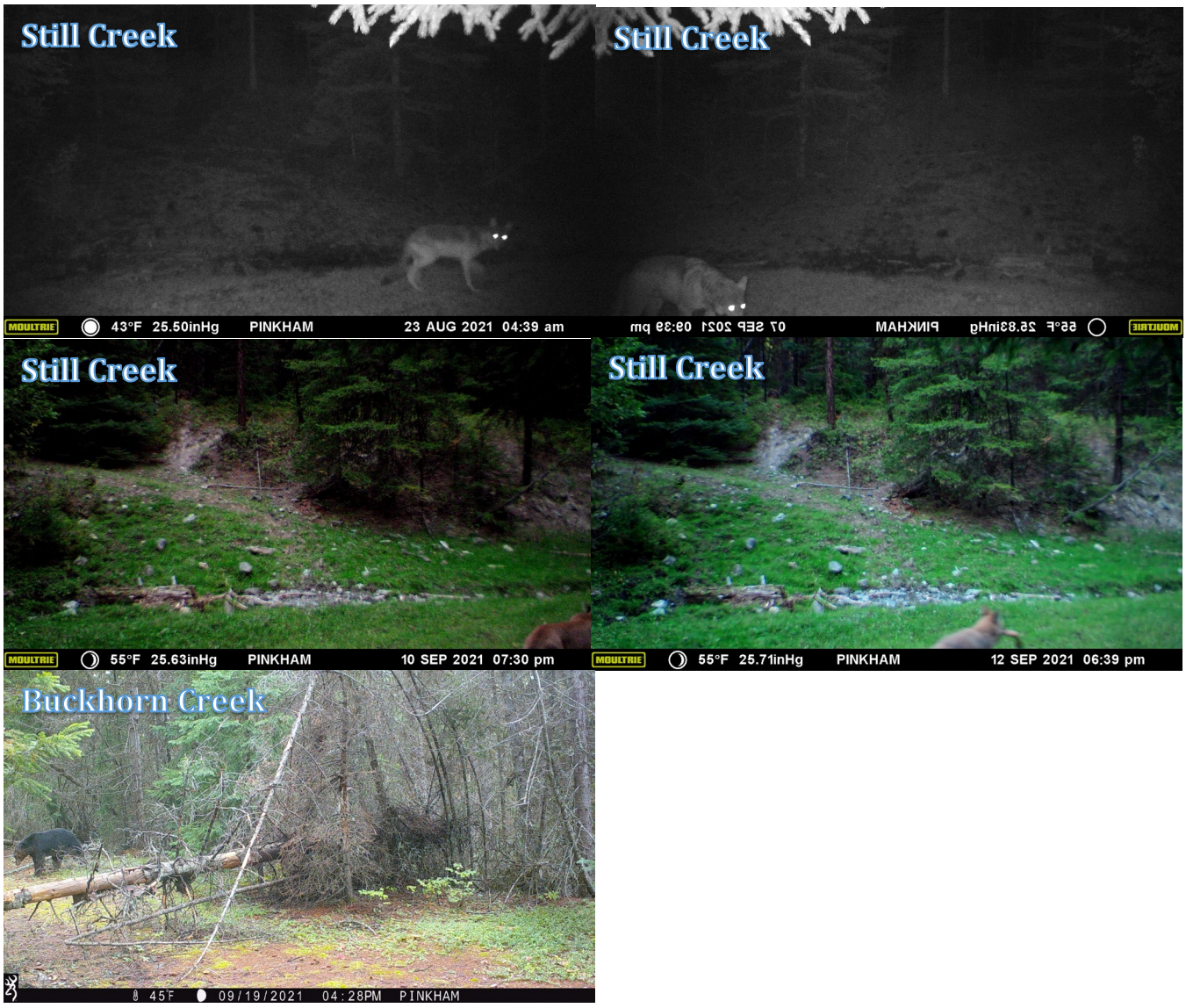
Pinkham Creek

The Pinkham Creek area had the most cattle of any of the allotments and the cattle spread out over much of the range. Parrish cattle largely seemed to stay in the Still Creek area of northwest Pinkham, while Blankers' cattle moved over to Pinkham Mountain and Edna Creek area towards the middle of the season.

Similar to the other allotments in the early season, there wasn't significant or considerable concentrated wolf sign for most of June and July. A juvenile black bear was sighted in early June on lower West Pinkham Road. Wolves were photographed on the Still Creek game camera in August.

Howling wolves were heard several nights in late July while staying at the Pinkham corrals. Game cameras were relocated to the area.

A large black bear sow and adolescent cub were spotted in the Buckhorn drainage of East Pinkham at the end of August. Increased wolf activity was evident in mid-September. The cattle were gathered in late September.



Sunday Creek

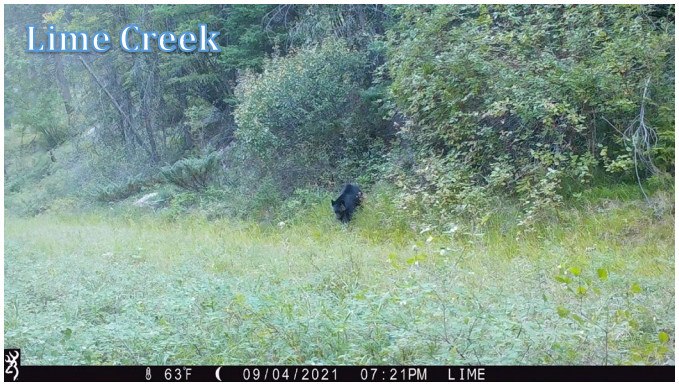
The Sunday Creek allotment had the most predator activity in the early season, alongside Swamp Creek. There was significant coyote and wolf sign along Advent Creek Road 3710A and Marsh Road 3713. Game cameras were placed in the area and more time was spent riding the area. Predator activity on the decreased until September. There was a significant increase in scat, sign, and howling in mid-September along Sunday Creek Road 315 and Blessed Creek Road 3711. Two adults were heard howling the following week in the Blessed Creek area.

The first two seasons of the Trego Range Rider Program showed considerable wolf presence in the Sunday Creek area, while the 2020 season indicated a reduced presence. It should be noted this year that the activity picked up significantly in September and culminated in a suspected calf loss at the end of September.

Trego (Lime, Magnesia, Brimstone Creeks)

The Trego allotment contained a pasture lease for the lower Lime Creek area, as well as open range above the railroad and across the Lime, Magnesia, and Brimstone drainages. The permittee for the Trego

allotment also held the Sunday Creek permit, and his cattle would move freely between both ranges.



The cattle on this range moved to the Sunday Creek area early in the season, and then moved to the Trego range later in the season.

Predator activity was minimal in this area of the Kootenai for most of the season. Several residents on Fortine Cr. Road mentioned hearing howling near Brimstone Creek, however, game cameras did not capture any activity. Towards the end of the season wolf sign was noticed close to Louis Lake, headed towards Sunday Creek. A black bear sow and two cubs were sighted twice in the Brimstone area.

The permittee started gathering in mid-September. One cow was gathered towards the end of September with bite marks on her right flank and her calf was missing. The permittee noted that that particular band of cattle was seen at the Paul Creek corrals recently, indicating that they were pushed from the Sunday allotment to the Trego allotment over a course of a few days. Efforts to locate the missing calf were unsuccessful.

Jim-Stewart Creek

Predator activity on the Jim-Stewart state lease was minimal throughout the season. Cattle stayed relatively close to the permittee's privately-owned land that borders the state lease. The cattle stayed in relatively large bands for most of the season.

Little wolf activity was noted here. Scat was occasionally found along Road 3762 on the state land, but no wolves were recorded on game cameras in this area.

VII. Losses

Table 2. 2021 Cattle Losses on Trego Allotments

Allotment	*Losses**
Swamp-Lake Creek	3
Swamp-Fortine Creek	3**
Pinkham Creek	4***
Trego	0
Sunday Creek	1
Jim-Stewart Creek	1

**Unconfirmed kills; most losses are discovered after gathering*
***The Swamp-Fortine Creek Allotment sustained two losses from train collisions*
****Pinkham Creek sustained a confirmed loss from a vehicle collision*

In addition to predation, losses on any allotted range program could be attributed to cattle sickness, weather/environment conditions, vehicular collisions, and human caused mortalities and theft. It should be noted that several of the ranges (specifically Pinkham, Swamp-Fortine, and Swamp-Lake Creek) are located within moderate vehicle traffic and recreation areas.

Figure 2. Map of Livestock Carcasses Found 2021 Season and Range Rider Tracking Data

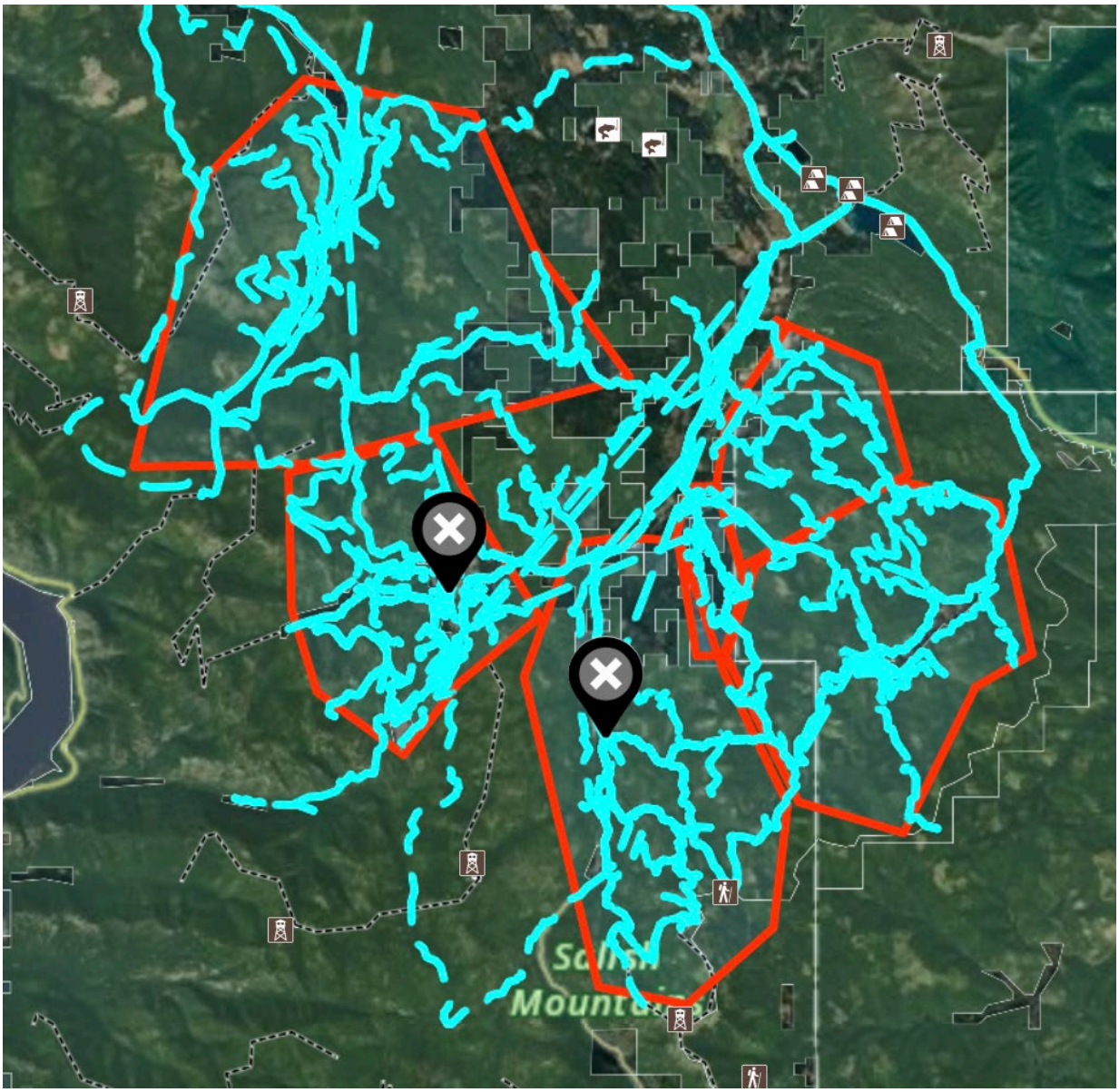


Figure 2 shows the general outline of the cattle use of their corresponding range and the tracking data from the entire season.

Wildlife Services-Montana: Gravelly Mountains Range Rider Program End of Season Report 2021

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS)

WILDLIFE SERVICES (WS) – MONTANA

November 2021

Introduction

This report provides information on Wildlife Services-Montana (WS-Montana) range rider activities in the Gravelly Mountains. The Gravelly Mountain range rider program marked its second season in 2021, made possible with cooperative funding from the Greater Yellowstone Coalition. The season lasted from May 10, 2021 to Oct 22, 2021. This area remains a high priority as grizzly bear conflicts with livestock in the Gravelly Mountains persist. The position covers more than 35 U.S. Forest Service grazing allotments, many of which have livestock owned by multiple livestock producers.

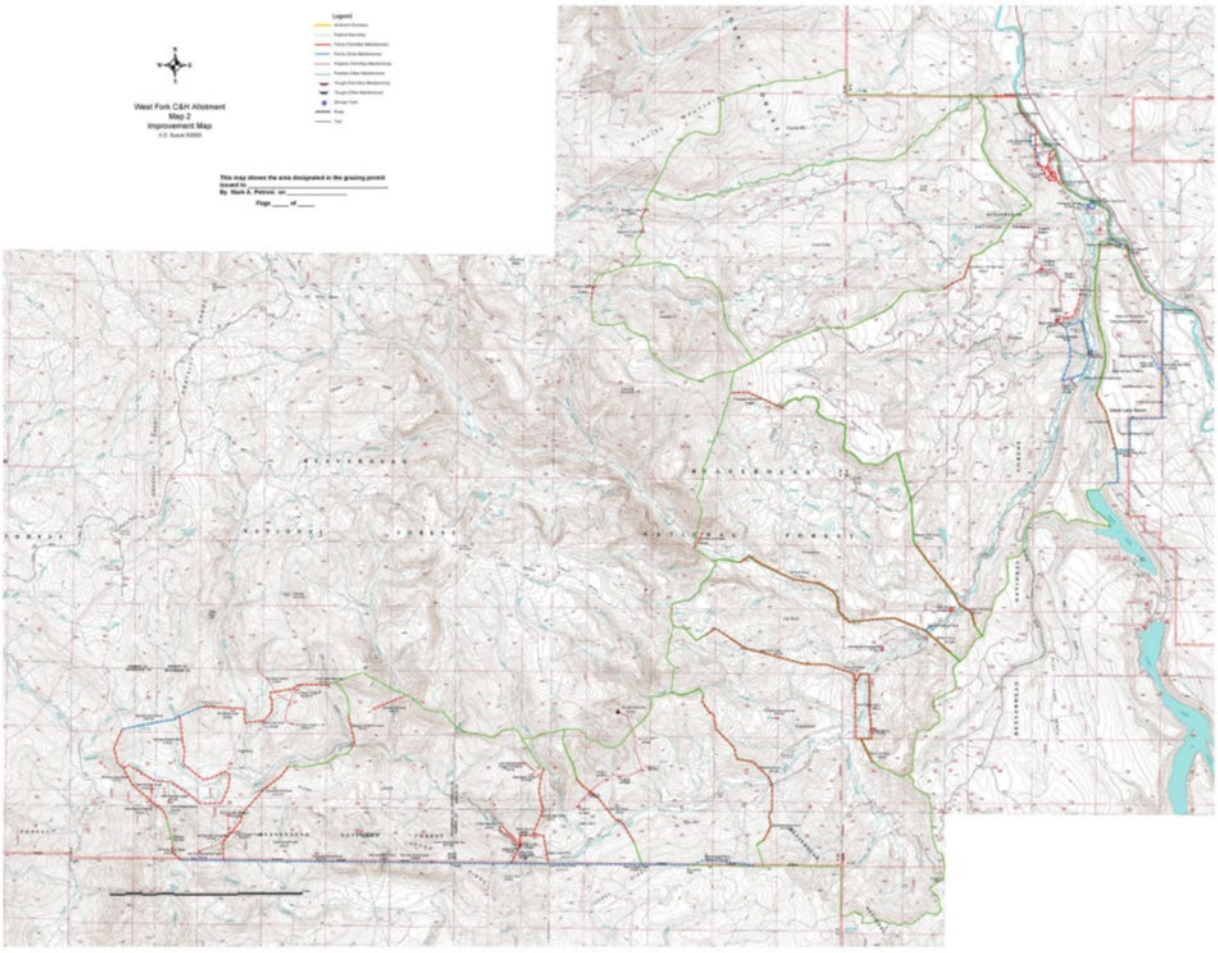


Figure 1. Map of Allotments on the Beaverhead-Deer Lodge National Forest.

Operational Activities

WS-Montana the same range rider in the Gravelly Mountains for the second consecutive year. This employee possesses a wealth of knowledge due to their experience as the Gravelly Mountain range rider in 2020, previous experience working in the Gravelly Mountains, knowledge of predator behavior, and existing relationships with permittees that allow for open communication. After completing the onboarding process, field work in the Gravelly Mountains began on May 10, 2021. Permittees were contacted at the beginning of the season to inform them of WS-Montana range riding activities and to provide contact information. Initial contacts also provided information regarding permittee range dates, allotment distribution, class and number of livestock, and whether or not herders would be on site.

The Gravelly Mountain range rider is responsible for monitoring allotments for predator sign. Over the season, the range rider conducted 102 site visits across 19 different allotments in the Gravelly Mountains. Records were kept when the range rider observed tracks, scat, game camera photographs, and actual sightings of predators. The range rider reported active predator sign during 41 (40.2%) site visits. Multiple species were detected on a single site visit on several occasions. Species observed included grizzly bears (45.3%), wolves (41.5%), black bears (9.4%), mountain lions (1.9%), and coyotes (1.9%). Detection methods included tracks (53.1%), scat (16.3%), livestock mortalities (12.3%), use of telemetry equipment (6.1%), game cameras (6.1%), and reports from herders on the allotments (6.1%). Figures 2 and 3 (below) further detail predator detection by species and method.

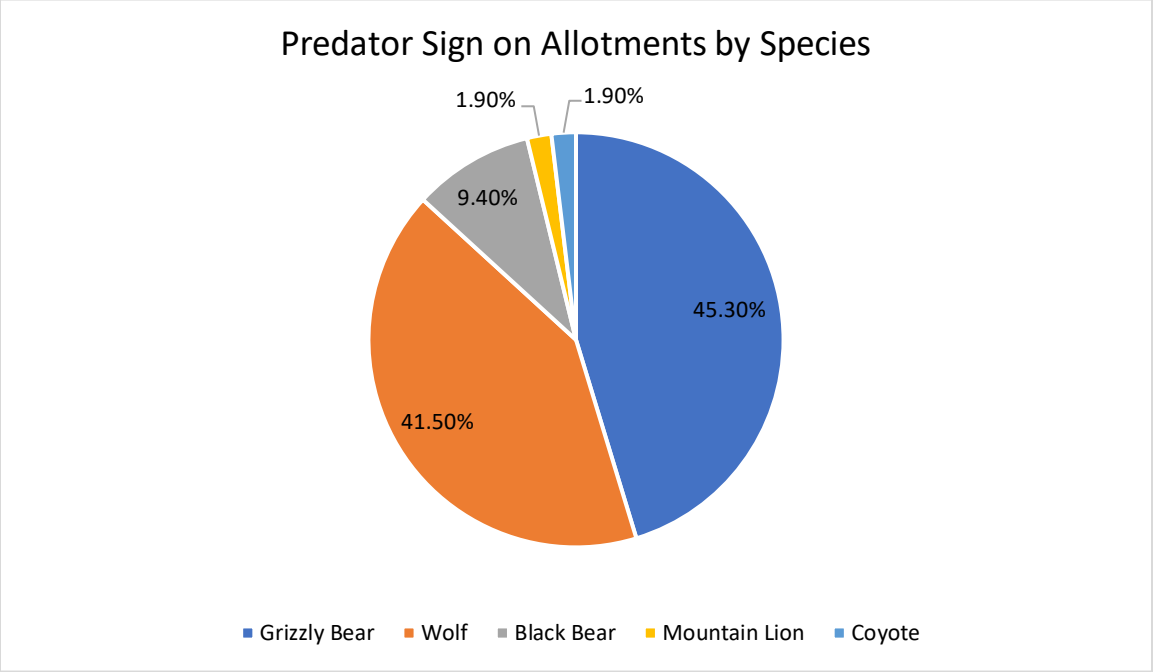


Figure 2. Predator species detected by the Gravelly Mountains range rider by prevalence.

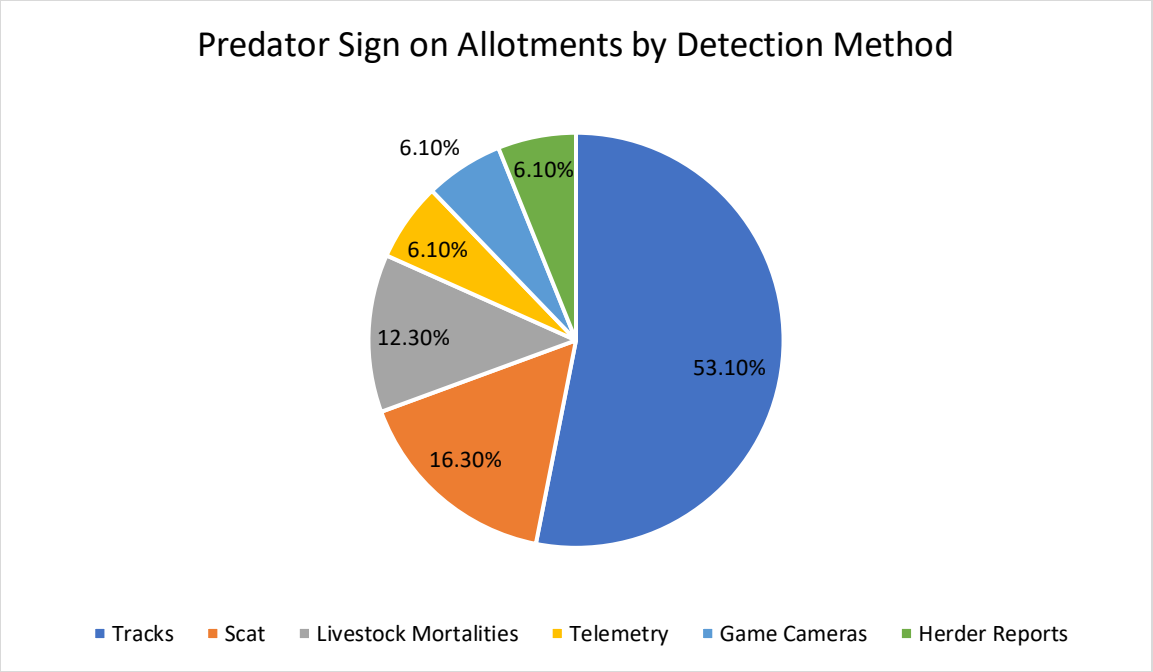


Figure 3. Means of predator detection by the Gravelly Mountains range rider by prevalence.

While conducting site visits, the range rider noted livestock behavior. Additional investigations were conducted when livestock were agitated to determine the cause of agitation. The range rider provided reports to permittees and herders on livestock behavior. The range rider assisted permittees with livestock relocation seven times this season in response to heavy concentrations of predator activity. The range rider also monitored herds for signs of ill or injured livestock. Permittees were notified when sick or injured livestock were discovered. The range rider often assisted in doctoring livestock as needed. Reports were made to livestock owners or herders when livestock were found in the incorrect pasture or allotment. Assistance was provided to return stock to the correct pasture. The Forest Service and livestock permittees were notified when fences were downed, and the range rider worked to determine the cause of the breach. Stray calves that had wandered away from cows were gathered and returned the appropriate herd.

The range rider contacted livestock owners and herders when injured or dead livestock were discovered. The WS-Montana Wildlife Specialist in the area was also notified when the cause of death or injury was believed to be predation. The range rider often assisted the wildlife specialist in conducting investigation reports, including a site investigation and an examination of injured livestock or carcasses to determine the cause of the injury or death. The investigation determines if predation was the cause of death and, if possible, what species was responsible. The range rider assisted the wildlife specialist with livestock necropsies. This was helpful in verifying the cause of death and provided an additional safety measure by monitoring the site for predators that may attempt to approach the carcass during the investigation. The range rider also provided information to stakeholders, NGOs, and interested parties at outreach events on May 27 and August 25.

Livestock Losses

Total livestock losses for the 2021 Gravelly Mountain range rider field season were 38 calves, 4 sheep, 2 cows, 2 lambs, and 1 guard dog. Livestock losses to grizzly bear predation consisted of 1 cow and 18 calves confirmed, 1 cow and 11 calves probable, 2 lambs confirmed, and 4 sheep probable. Wolf depredations were responsible for the loss of 8 calves and 1 guard dog confirmed, and 1 calf probable. The total value of livestock losses for the 2021 field season was $33,270. Grizzly bear predation accounted for $25,440 and wolf predation accounted for $7,830. Figures 4 and 5 (below) further detail livestock losses to predation.

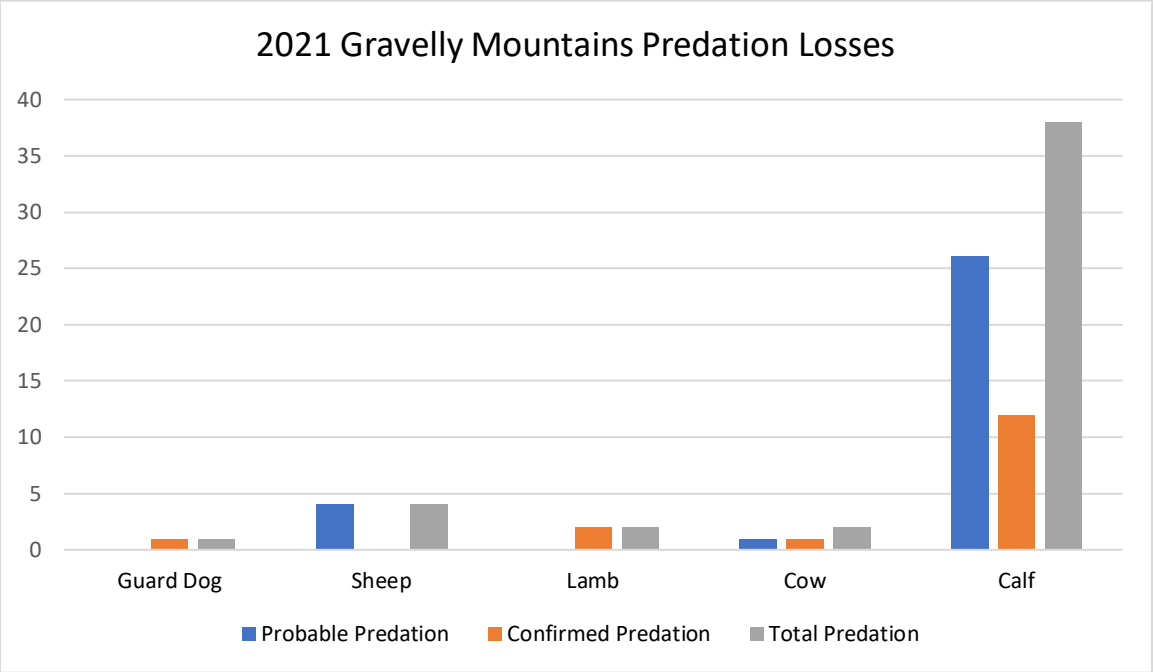


Figure 4. WS-Montana confirmed/probable livestock predation losses in the Gravelly Mountains during the FY21 field season.

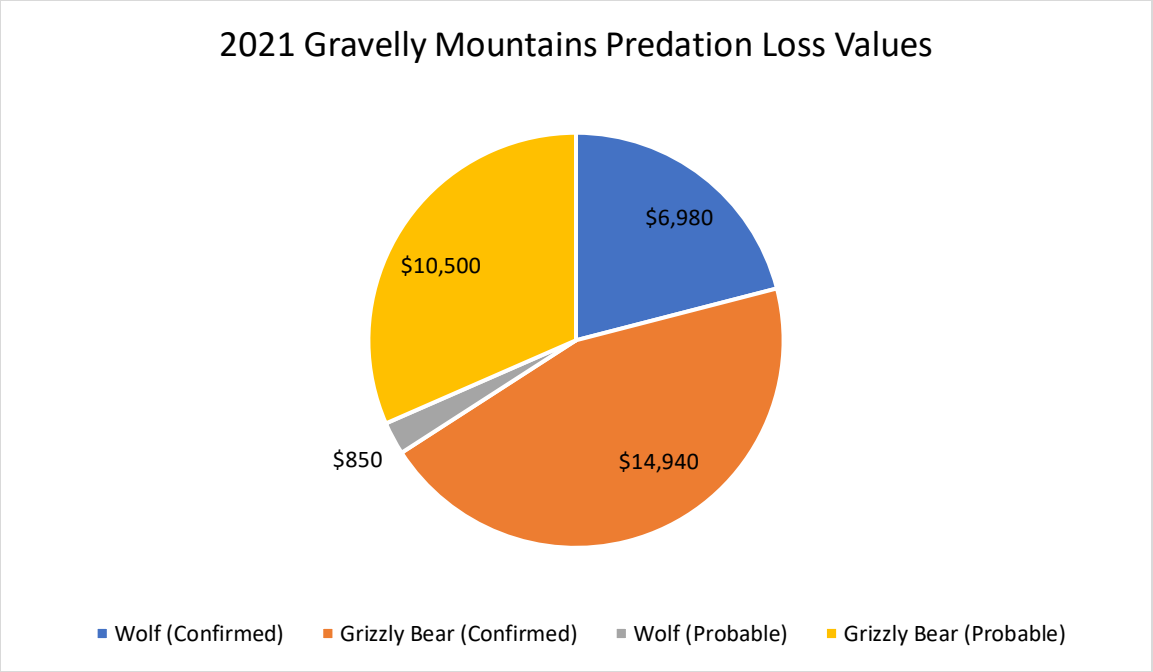


Figure 5. WS-Montana confirmed/probable livestock predation loss values for the Gravelly Mountains in the FY21 field season.

Conclusion

As the Gravelly Mountain range rider program continues, WS-Montana is convinced that the presence of the range rider on the allotments provides multiple benefits. The range rider succeeded in the program's primary duties of detecting predator presence, deterring predation on livestock, and working with permittees to determine the best approach to minimize further conflicts with wildlife. In addition to primary duties, the range rider assisted in livestock relocation in response to predation, downed fences, and returning stray calves. WS-Montana has received positive feedback from many of the permittees who are appreciative of the assistance provided by the range rider position and would like to see the program continue. Multiple permittees have expressed gratitude towards the Greater Yellowstone Coalition and other NGOs for their support of the Gravelly Mountains range rider program. WS-Montana believes that the one of the best metrics for the success of this program is the satisfaction of permittees. Federally appropriated funds will be available to continue this program in 2022 with the continued support of cooperative NGOs.

USDA Wildlife Services – Montana 2021 Annual Report

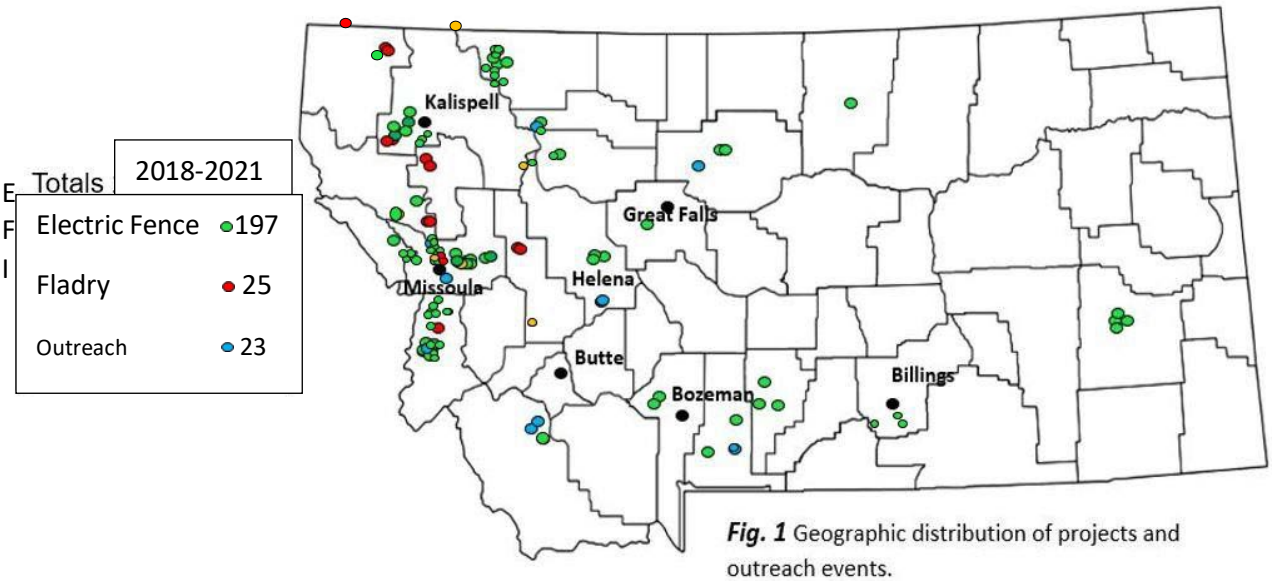


Fig. 1 Geographic distribution of projects and outreach events.

The Conflict Prevention Specialist (hereafter Specialist) position is the result of a multi-year collaboration with Natural Resource Defense Council (NRDC), Defenders of Wildlife (Defenders), and the Montana Livestock Loss Board (MLLB). 2021 is the 3rd consecutive year for the permanent position, and second for the seasonal RMF Specialist. We are fortunate to provide continuity in landowner and agency relationships. These positions focus on conflict prevention measures, for large carnivore conflicts through educational outreach, and project planning. Working across Montana, the Specialists have been involved in building permanent and temporary barriers to protect livestock (sheep/cattle) as well as bee yards and chicken coops. Conflicts are typically resolved in 1-3 weeks from producer contact/site visit depending on project scale and producer readiness.

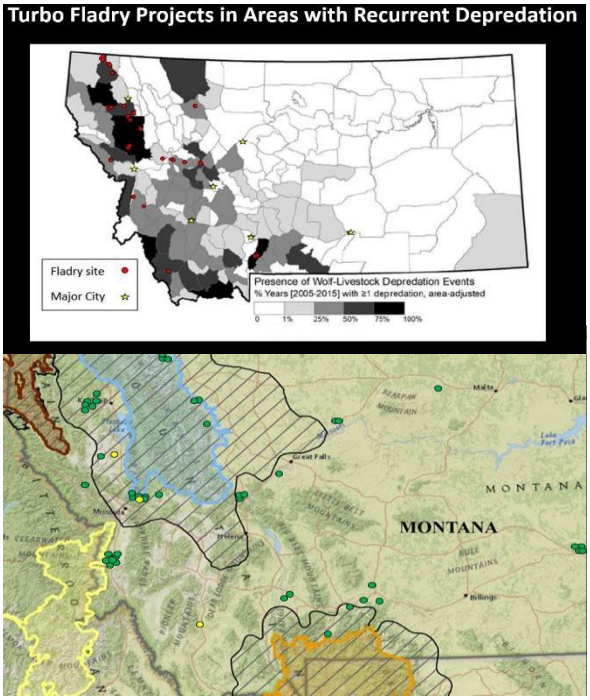


Fig. 2 *Top;* Heat map generated by DeCesare et al. visualizing wolf/livestock conflicts with Fladry sites overlaid. *Bottom*; Map generated by USFW showing Grizzly recovery zones in Montana with electric fence sites overlaid.

Summary

Figure1 illustrates the geographic distribution of projects carried out across Montana from Feb 2018 through Oct 1, 2021 including the increase of 72 projects as of Oct 1st. Early snow and freezing temperatures kept additional sites from going up. All fladry sites were taken down in April. This brings the total number of conflict prevention projects completed since 2018 to 202 completed projects, which continue to be Wildlife Services (WS) lead and WS assisted. **Figure 2** shows locations of conflict prevention work in relation to known wolf depredation events, and core grizzly bear recovery zones in MT. Additionally illustrated are sites that are currently in the planning/negotiation stages with the landowners for the 2022 season. Specialists have attended 3 virtual education and outreach events resulting in >50 people reached, 7 contacts made with livestock producers who requested assistance and 4 additional projects being completed.

The continued growth in the number of projects in the last three seasons is indicative of increased collaborative efficiency, while planning time for individual small projects significantly decreased. The addition of a dedicated specialist to the rocky mountain front doubled total completed projects. More people are hearing about our program through continued outreach events/increased presence, thus generating more projects in that way.

In addition to ongoing efforts, the pilot "4H Program" was launched this year, after seeing interest, but with some difficulty meeting the 50% cost share requirements of our typical fencing program. WS, along with Blackfeet Stockgrowers (with funding from Vital Ground), NRDC, and Defenders launched the "4H Program" on the Blackfeet reservation, and in Teton, Pondera and Glacier counties. Through these efforts, 9 new projects were completed, 6 are ongoing, and 7 were maintained from the previous year resulting in $36,650 worth of fully funded livestock protection enclosures. Furthermore, the Blackfeet Fish and Game received funding to hire seasonal technician to assist with builds and purchased a storage unit for 4H supplies allowing more responsiveness to conflicts.

There remains a hesitancy to utilize fladry from producers because of the maintenance required, and its association with non-governmental organizations (NGOs). Projects are referred from WS Specialists (+6 from last year) and WS state office, Montana Fish, Wildlife and Parks (FWP) bear biologists, and Defenders with invitations to project sites extended to collaborators with permission of landowners. In this 4th year of collaboration, there was an increase in small scale projects completed which is largely due to a more streamlined approach, and more projects being referred from WS specialists, FWP, and Defenders.

We did have one Fladry barrier breach by feral dogs two days after enclosure set up.
This brings the success rate for enclosures to 99.5%

Livestock	Total Value
Swine	$ 12,000.00
sheep	$ 69,250.00
goats	$ 12,000.00
bees	$ 1,200.00
chickens	$ 1,155.00
4H	$ 27,550.00
Cattle	$ 1,868,500.00
Human safety	$ -
Total value	$ 2,013,175.00

Project type	Number of Projects
Fladry	4
Electric fence	68
Counties	12
Value protected by fladry	$ 1,776,00.00
Value protected by E-fence	$ 237,175.00

Noteworthy items:

- Launch of 4H program.
- Rocky Mountain Front RMF Specialist completed over previous year by 35%.
- Specialists assisted with development of prevention webinar.
- Up 12 total completed projects from prior.
- Large producer agreed to purchase fladry.
- Increased WS Specialist referrals and number of individual projects.
- Increased FWP referrals, both fladry and fencing.
- Outreach efforts (2 total events) this year.

Fig. 3 (Top) Conflict Prevention Specialist electrifying teaching 4H member how to electrify a corner on Rocky mountain front. (Bottom Left) Producer assists Specialist with electrically retrofitting existing enclosure to prevent Grizzly conflict. (Bottom right) Specialist with Blackfeet Fish and Game after installing an electric fence to keep Grizzlies from getting into dumpsters.

Current/Future Needs

One specialist is currently funded through December 2021, the RMF Specialist through October, 22 2021, pending renewal/award of federal appropriations. Contributions for the positions/projects have come from Wildlife Services at the national and state level, NRDC, and Defenders, United States Fish and Wildlife Service, Montana Fish, Wildlife and parks, and Blackfeet Fish and Game, and the Blackfoot Challenge on a case-by-case basis.

The additional conflict prevention specialist concentrated on the rocky mountain front, working directly with the Blackfeet Tribe and 4H has doubled the amount of completed projects. This brings the total number of projects in FY 2021 to 67. Additionally, the RMF specialist through the 4H program has allowed us to increase community and tribal relationships while serving and teaching the future of American agriculture. We hope to continue expanding the 4H program throughout Montana.

Fig 4. *(Left)* Wildlife Services along with 4H Participants after building an electrified enclosure to protect pigs after a Grizzly bear loss a week prior. *(Right)* Wolves walking the fladry perimeter at a site near Ovando, Mt at 3:30am

Acknowledgements

Special thanks to all our cooperators that have assisted with fladry and electric fencing projects this year. Our partners that contributed funding, coordination, outreach opportunities, and labor assistance. Thank you to Natural Resource Defense Council and Defenders of Wildlife, Vital Ground, Blackfeet Stockgrowers, for cooperative funding for the RMF Specialist position and 4H program; and the Montana Livestock Loss Board for providing supplies. Finally, thank you to Montana Fish, Wildlife, and Parks; WS's National Wildlife Research Center; Blackfoot Challenge, and our producers for participating in this successful collaboration.

NEVADA

United States Department of Agriculture

Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Wildlife Services

Nevada State Office
8775 Technology Way
Reno, NV 89521
(775) 851-4848

Fiscal Year (FY) 2021 Nonlethal Initiative End Of Year Report | USDA Wildlife Services – Nevada

Introduction

Nevada's wolf sightings have increased in the last decade from no sightings in northeastern Nevada (Washoe county) to 1-2/year. Although no livestock depredations from wolves have occurred, it was prudent for WS-Nevada to have a plan and response for such a situation. After research and considerable discussion with the WS-California Non-lethal specialist, WS-Nevada decided to purchase 2 one-mile self-contained turbo fladry systems.

Turbo fladry Purchase

During FY 2021, WS-Nevada utilized funding from the nonlethal initiative to order 2 miles worth of turbo fladry installation. WS-Nevada anticipates receiving the completed turbo fladry in FY 2022.

Training

WS-Nevada received turbo fladry training from WS-California during FY 2021.

NEW MEXICO

FY 21 Non-Lethal Initiative – USDA Wildlife Services – New Mexico

Collared Mexican Wolf – courtesy of USFWS

Mexican Wolf (Canis lupus baileyi)

The Mexican wolf is the rarest subspecies of gray wolf in North America. It is listed separately from the gray wolf as an endangered subspecies under the federal Endangered Species Act. In 1977, the U.S. Fish and Wildlife Service (Service) and many partners initiated efforts to conserve the subspecies by developing a bi-national captive breeding program with the seven remaining Mexican wolves in existence. Approximately 350 Mexican wolves are currently maintained in more than 55 facilities throughout the United States and Mexico. In 1977, the U.S. Fish and Wildlife Service initiated efforts to conserve the species. In 1998, Mexican wolves were released to the wild for the first time in the Blue Range Wolf Recovery Area (Arizona and New Mexico) in Arizona within the Mexican Wolf Experimental Population Area.

Partners in Mexican wolf recovery in the United States include the US Fish & Wildlife Service, Arizona Game and Fish Department, New Mexico Department of Game and Fish, USDA Forest Service, USDA APHIS Wildlife Services, White Mountain Apache Tribe, Bureau of Land Management, and National Park Service.

The annual count of Mexican wolves documented a minimum of 186 wolves distributed with 114 in New Mexico and 72 in Arizona. In 2019, the team documented a minimum of 163 wolves, which was a 24% increase from 2018. This population has nearly doubled in size over the last five years.

Employment

The non-lethal initiative provided funding for a full-time year-round employee. There was a lot of employee turnover throughout FY 21 associated with this position. It was vacant for the first 5 months of FY 21 under the supervision of the previous State Director. The position was filled on March 01, 2021. That person resigned on April 09, 2021. The position was filled again on June 1, 2021 and that person resigned on August 31, 2021. During position vacancies, eight of our existing personnel, whose primary responsibilities lie elsewhere, filled in and conducted depredation investigations. **Update:** A new non-lethal employee has been hired for FY 22 with the hope of bringing more long-term stability to the position.

Primary responsibilities of the non-lethal wolf specialist have been conducting livestock depredation investigations in areas occupied by Mexican wolves. This is a crucial initial step in determining what species of wildlife, if any, is responsible for the death of the livestock being investigated. After confirming what caused the death of the livestock, a non-lethal mitigation plan can be formulated and implemented. There was a total of 112 depredation investigations conducted on 36 properties in New Mexico for FY 21. It was determined that 79 (71%) of those investigations were confirmed as being caused by Mexican wolves. Due to the high number of investigations conducted in New Mexico throughout FY 21, and the non-lethal employee turnover, only investigations and verbal non-lethal recommendations were provided to resource owners. **Update:** A full-time year-round range rider has been hired and will be deployed to areas of high wolf conflict and recent confirmed wolf depredations. This position is funded with federal non-lethal initiative appropriations and cooperative funding from the New Mexico Department of Game & Fish.

Wolf Track

FY 21 Non-Lethal Projects

Type of Project	# completed in FY21	# of cooperators served	Any additional notes
Fladry			
Range riding			
Permanent fencing			
Electric fencing			
Dog placement			
Harassment			
Visual and/or audio deterrents			
Outreach Events			
Technical Assistance	N/A		
Depredation Investigations	112		
Other (please specify)			
Total	112		N/A

Contributions – FY 21

Federal Non-Lethal Initiative Appropriations - $100,000

Financial Breakdown

Personnel Salaries/Benefits	84.0 %
Equipment	9.0 %
Supplies / Postage	3.8 %
Travel / Training	3.2 %
Total	100.0 %

FY 22 Non-lethal Planning

Hire a range rider to monitor for wolf presence, locate carcasses, and when appropriate haze wolves from areas with high or reoccurring livestock/wolf conflicts.

Hire a non-lethal wolf specialist to conduct livestock depredation investigations and implement other non-lethal methods to mitigate negative wolf/livestock interactions.

Transition depredation investigation reports to the electronic Survey 123 format. This should standardize reporting and make it more efficient, providing completed reports back to the resource owner in a more timely manner. The resource owner then has the option to submit confirmed wolf depredations for compensation.

Seek additional funding to hire another non-lethal position, whose primary responsibilities would be implementing non-lethal methods to mitigate wolf/livestock conflicts

Work collaboratively with USFWS to capture and radio collar wolves that have no pack members collared, to monitor and track wolf locations and movements.

Purchase and acquire equipment and supplies to support non-lethal mitigation projects.

OREGON

INTRODUCTION

USDA-Wildlife Services Oregon (WS-Oregon) has two full-time Conflict Prevention Specialist positions working year-round. The two positions are both located within the SW District (Figure 1), with one in Jackson County and one in Klamath County. The idea of a Conflict Prevention specialist for Oregon started in 2018, with one seasonal part-time position that was funded by Jackson and Klamath Counties through their respected Wolf Advisory Committees. Additionally, the conflict prevention efforts gained cooperative support and or funding from other groups such as the Natural Resource Defense Council (NRDC) and Defenders of Wildlife (DOW). With their continued support, these local collaborations helped to support the national efforts that allowed APHIS-WS to receive congressional funding to add full time and or seasonal positions in 12 states. Currently, the WS-Oregon specialists are funded through the following contributions: USFWS Region 8 ($90,000 for a multiyear agreement 2019-2024), Jackson County Wolf Advisory Committee ($11,000), Klamath County Wolf Advisory Committee ($14,000), and the FY21 appropriations package dispersal ($97,000).

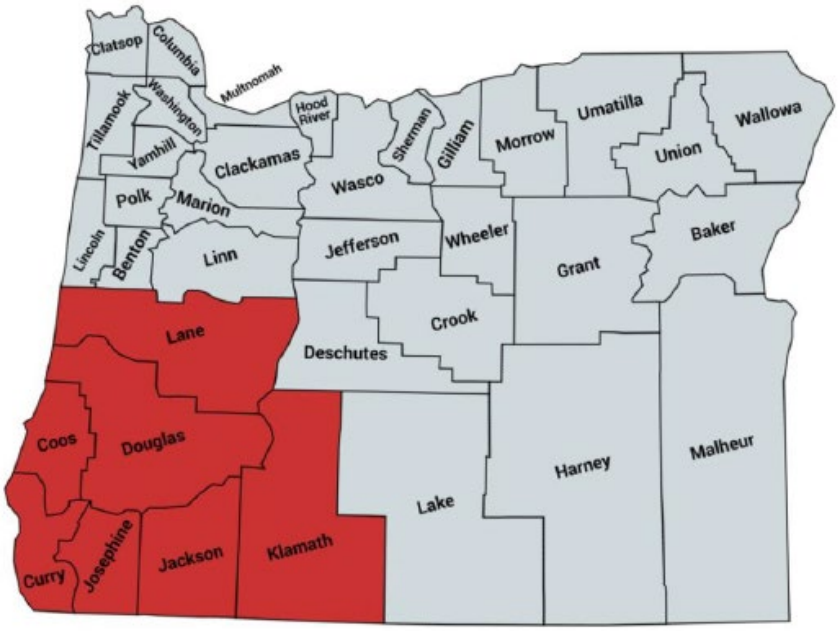


Figure 1: Southwestern District

Highlights/Stories

For non-lethal technicians it can be a daily challenge to articulate the importance of the tools we bring to the table as it applies to wildlife damage management. By maintaining daily working relationships with State agencies, County committees, and with local producers and cooperators we have been able to build foundations of trust that enables us to increase the capacity of services we offer. In 2021 we were able to expand our non-lethal efforts, building upon those earlier foundations of trust, and increased interest from more participants and or increased delivery of services.

Since the creation of the WS-Oregon Conflict Prevention specialist positions, the specialists in those positions have been working collaboratively with large livestock producers to backyard hobby farms throughout the SW District when their assistance is requested to help mitigate further predation from large predators. While working with producers on-site, the specialists provide information on the tools and methods WS-Oregon are using. Some producers have been extremely receptive to the information provided and have either requested that we loan equipment temporarily and / or to be assisted by the specialists. Some producers have seen or heard of the successful efforts and have begun working independently when WS-Oregon specialists were not available. Some examples of this are:

1) A producer in Douglas county, requested about a 1/2mile of turbo fladry and a couple fox lights to help mitigate some sheep predation by coyotes. The producer reported that the fox lights coupled with the fladry seemed to help mitigate predation for a short period until he could move his band away from the area.
2) A cattle producer in eastern Klamath recently lost cattle to wolf predation. WS-Oregon Specialists have been conducting night watch to attempt to keep wolves from interacting with the producer's cattle. The producer has been doing their own mini-night watch when WS staff are not available.

Financial Breakdown

FY21 Funds used by Category

Personnel Time	69%
GSA	14%
Equipment/Supplies	12%
Repair Service	4%
Hires	1%

During the FY21 field season WS-Oregon purchased a RTV Side-by-Side and a trailer to haul it to aid in accessing remote areas that cannot be driven with a standard GOV truck in adverse weather conditions.

Available Non-lethal Resources and Tools

- Fladry (approx. miles)

On hand: 6.5 miles

On loan: ½ mile (Douglas)

- Fox lights

  On hand:12

  On loan: 5 Units (Klamath), 2 Units (Douglas)

- Scare boxes

  On hand:1 Unit

  On loan: 1 Unit (Klamath)

- Temp electric fence/ Charger

  On hand: 5 Units

  On loan: 0

- Trail Camera

  On hand: 14 Units

  Deployed: 3 Units

- Other (pyros/bean bag rounds)

  On hand: 25 cracker rounds /18 bean bag rounds

WORK SUMMARY

Trainings Attended

- Annual Firearms and Pyrotechnics Training
- USDA APHIS Wildlife Services Oregon State Conference
- National Training Academy Annual Firearms Training

Meetings Attended

- Jackson County Wolf Advisory Committee meetings
- Jackson County Stockman's meetings
- Klamath county Wolf Advisory Committee meetings

Technical Assistance

- 47 Hours of Outreach with livestock producers
- Assisted ODFW with 5 Livestock Depredation Investigations

Direct Control

- 43 nights of Harassment/ Night Watch.
- 14 nights of scare box and fox light deployment.
- 149 days Range Riding with trucks, horseback, on foot or using sxs.
- Bone pile removal increased to new areas in Eastern Klamath County.
- 2 electric fences temporarily installed for large predator exclusion.
- Assisted in maintaining over 5 miles of range fence for efficient gathering of cattle.
- Assisted in Maintaining Mil Mar Electric fence.

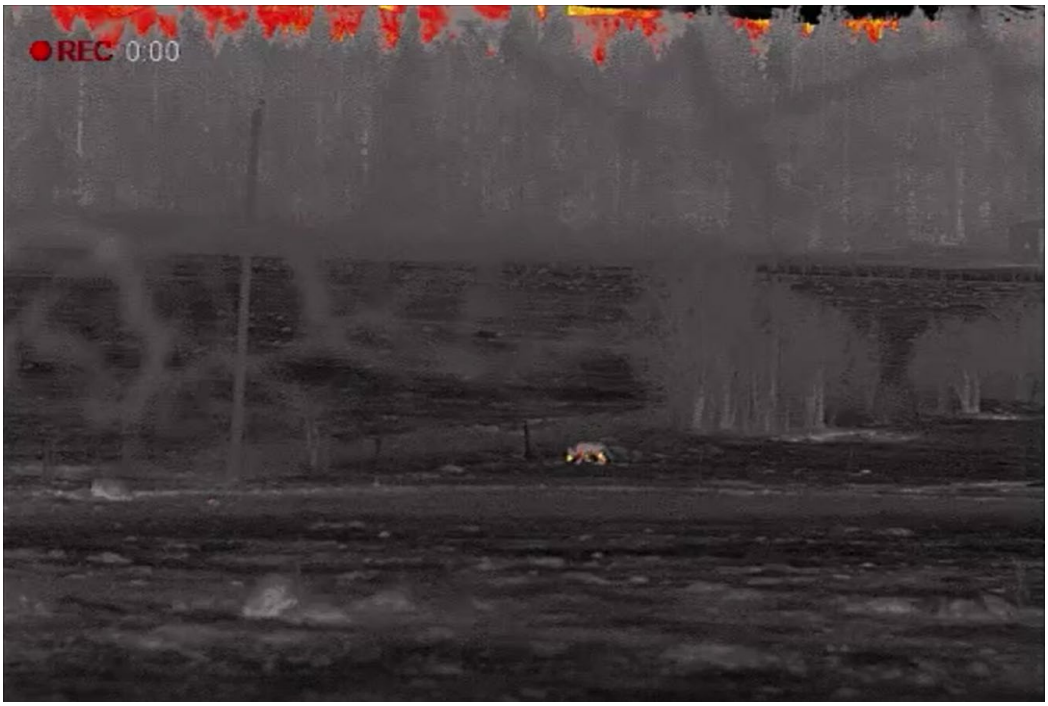
Type of Project	# completed in FY21	# of cooperators served	Any additional notes
Fladry			
Range riding	149	8	Checking cows, fences, cameras, predator sign
Permanent fencing	1	1	Range fence
Electric fencing	2	2	For bear and lion
Dog placement			
Harassment	43	13	Night watch
Visual and/or audio deterrents	14	4	Scare box/ fox lights
Outreach Events	4	3	Meetings from winter 20/21
Technical Assistance	9 606*	9 713*	Multiple Species *statewide w/above TAs
Depredation Investigations	5	4	2 Klamath County/3 Jackson County
Carcass/ Bone removal	13	4	New locations in Klamath county
Total	837	752	

Acknowledgements

Special thanks to all our cooperators that have assisted in funding this position and to many of our partners who have contributed though funding, coordination, outreach opportunities, and labor. We also thank those cooperators who are supporting our field activities and encouraging others to collaborate. Thank you to Natural Resources Defense Council and Defenders of Wildlife for cooperative funding and assistance in creating this position, as well as the County Wolf Advisory Committees for providing supplies and financial support. Finally, thank you to U.S. Fish and

Wildlife Service, Oregon Department of Fish and Wildlife and our livestock producers for participating in this exciting collaboration.

Field Photos



Photos by Mason Wolf, USDA WS


NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT


USDA

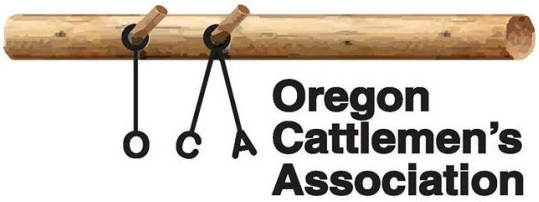

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE


Wildlife Services
NWRC
National Wildlife Research Center


OREGON
Fish & Wildlife


JACKSON COUNTY
Oregon


KLAMATH COUNTY


O C A
Oregon
Cattlemen's
Association


JACKSON COUNTY
STOCKMEN'S ASSOCIATION

WASHINGTON

Fiscal Year (FY) 2021 Nonlethal Initiative End Of Year Report | USDA Wildlife Services − Washington

The Wildlife Services (WS)-Washington/Alaska program (WS-WA/AK) does not currently provide wolf damage management services to livestock producers in the state. Wolf management and wolf damage management activities are conducted by the Washington Department of Fish and Wildlife (WDFW). WS supports nonlethal livestock protection in Washington by using the $20,000 in funds received from the WS Nonlethal Initiative in FY2021 to purchase fladry and associated equipment. This equipment is loaned to WDFW for their livestock protection activities. When using the loaned fladry equipment, WDFW participates in ongoing WS National Wildlife Research Center (NWRC) research projects conducted as a part of the Nonlethal Initiative. These research efforts are helping WS determine best practices related to nonlethal livestock protection methods.

WISCONSIN

United States Department of Agriculture-Wisconsin Wildlife Services

FY2021 Non-Lethal Initiative Report

Introduction: Gray wolves and black bears occupy significant portions of Wisconsin and continue to expand their range into more forest-farmland fringe regions of central and southern Wisconsin. The wolf and black bear populations are estimated at 1,050 and 26,500, respectively. WIWS has had cooperative agreements with the Wisconsin Department of Natural Resources (WDNR) to provide assistance with managing conflicts caused by these species for more than 30 years. With the recent delisting of wolves in the United States, management of the specie was returned to the WDNR. WIWS staff is a member of both the WDNR's wolf harvest and wolf management planning committees. The WDNR is updating its wolf management plan and it is projected to be completed by late summer of 2022. Wolf and bear conflicts in Wisconsin are conducted in accordance with existing wolf and bear conflict management policies, rule, and guidelines and NEPA documents. WIWS typically investigate 150 – 200 wolf complaints annually, of which approximately 50% are confirmed. Compensation for wolf damages in WI range from $150K – 200K annually.

Staffing: Seven staff (1 full-time year-round, 4 full-time seasonal, 2 interns) direct-charged hours to the non-lethal carnivore funding initiative. Two employees were summer/seasonal interns, and the remaining staff are involved in a variety of other wildlife damage management activities but provided assistance with non-lethal carnivore work based on their duty stations and the conflict sites. One employee in northwest Wisconsin conducted most of the activities from this funding source. Future plans may increase the amount of funding provided to support this position and have the employee provide more assistance across a wider area than was accomplished this field season. Given the wide geographic distribution of wolves and black bears in WI, additional staff may be incorporated into non-lethal projects in 2022.

Sheep Farm in Price County: In 2020 WIWS funded (non-lethal initiative funding) a predator-proof fencing project in Price County, WI to protect a flock of 300 sheep on an 80-acre farm that has sustained chronic depredations and excess killing depredation events (>30 sheep depredated in one event). The fence project protected 25 acres of the farm where lambing occurs. The farmer was grazing sheep outside the fence to manage vegetation and wolves depredated a ram. No depredations occurred inside the fence. The farmer has attested that

without the predator-proof fence that wolves would make his farm unprofitable. In addition, one genetically superior ram used for breeding was pastured outside the predator-proof fence to facilitate animal husbandry requirements. This area was protected by a WIWS developed scare radio. The producer stated, "without that radio, that ram would have been killed." During travels around the farm staff routinely note wolf scat and tracks on town roads surrounding the farm.

Dairy Farm in Sawyer County: In the Midwest stored livestock feed is commonly stored in plastic silage bags laying on the ground that are approximately 8' in diameter and several hundred feet long. Uncommon but occurring every several years, farmers have reported wolves climbing onto these bags and damaging the protective plastic membrane with their claws. This allows moisture to seep into the bag causing mold and feed spoilage. On occasion wolves may actually dig into the bag causing extensive damage to the bag. The reasons wolves do this is unknow but there may be an olfactory que stimulating this behavior. In this instance, the bag was protected with turbo fladry successfully preventing further damage. Wolves later depredated an adult Holstein cow that was being pastured in an area not protected by fladry. Proper carcass disposal was discussed with the farmer who has since began implementing a carcass composting system on the farm.

Beef Farms in Bayfield County: Two farms in northern Bayfield County sustained harassment and depredation events to livestock (beef calves and sheep). These farms are within 6 miles of the Red Cliff Band of Lake Superior Chippewa. Wolves, or ma'ingaan (Chippewa name for wolves) are culturally important to this Nation. Per our NEPA and 2021 MOU documents, WS must attempt to consult with Tribal biologists regarding wolf depredations occurring within 6 miles of Tribal boundaries. Per these consultations, it was decided to implement fladry on these farms in an effort to prevent additional wolf/livestock conflicts. During the course of the grazing season no additional losses were documented. However, one wolf with a GPS radio collar was identified as being inside the fladry perimeter. Considerations for predator-proof fencing are being evaluated for these farms.

Beef Farm in Burnett County: One of the Wisconsin's largest beef operations in northern Burnett County which has sustained wolf depredations annually for approximately 30 years did not sustain any depredations during the 2021 grazing season. The farm has a 5-strand barbed-wire fence that is well maintained. In 2015 (wolves Federally protected), WS installed a single strand of electrified poly-tape and a smooth electric wire between the soil surface and the bottom strand of barbed wire. WS has maintained this 6.2-mile fence project since 2015 which requires weekly inspections from April – October as it is common for the electrified fence to ground out on the barbed wire (turkeys will walk underneath the electrified wire and push it upwards where it becomes entangled with the barbs on barbed wire fence). WS involvement with this project is two-fold, the maintenance of a permanent fence and range riding (human presence). The weekly presence of WS staff on ATV's patrolling the fence likely aids in reducing the attempts to breach the fence. Wolves have depredated calves on this farm in previous

years while the electric fence has been installed. It should be noted that six wolves were recreationally harvested during the February 2021 wolf harvest season near this ranch.

Black Bear Damage to Field Corn in Price, Rusk, Sawyer, and Taylor Counties (PRST): During the months of August and September when field corn enters the milk stage of maturation, black bears move into fields causing significant damage. Through cooperative agreements with county land and water conservation departments, WIWS staff enroll farmers into the Wildlife Damage Abatement and Claims Program to abate this damage with trapping and translocation. In 2021 there were 66 farmers enrolled covering 42,606 acres in PRST. There were 382 black bears captured and translocated. From earlier peer-reviewed work conducted between WIWS and NWRC, only 4% of translocated bears recidivated.

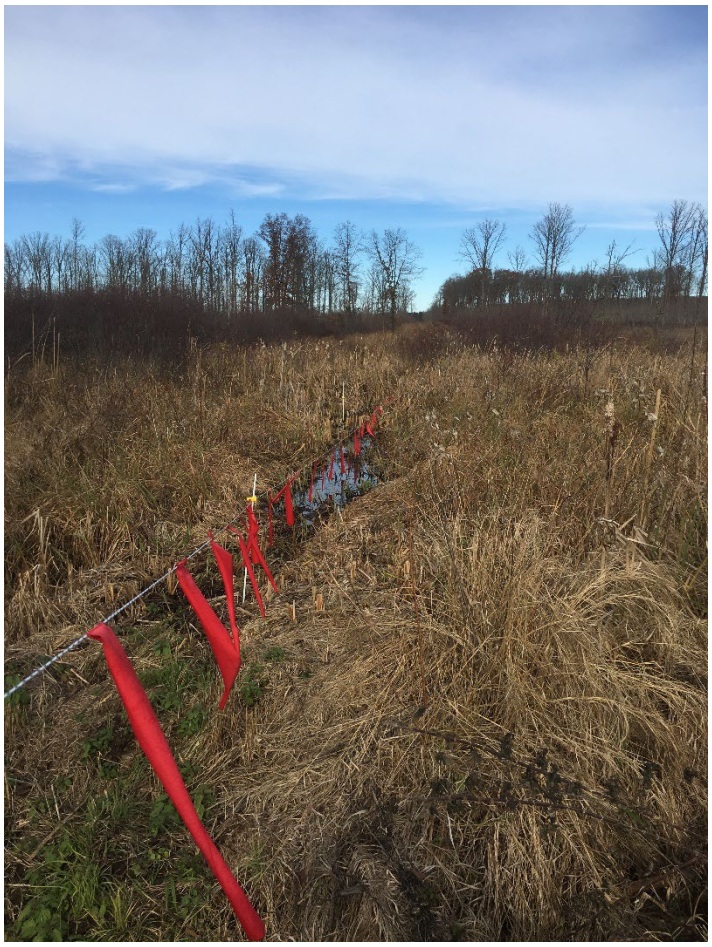
Wolf damage to a silage bag in Sawyer County, WI, 2021.

Wolf interacting with fladry and cattle, Forest County, WI, 2021.

WIWS has used fladry since 2004. The second state nationally (IDWS/Rick Williams was the first) to use as a wide scale abatement technique for wolf conflicts. WIWS current inventory of fladry is approximately 17 miles. Approximately 10 miles are shown in photo.

WIWS technician, Ashley Morin, managing the electrified fence on a large beef operation in Burnett County, WI. The first electrified wire was poly tape which has subsequently been replaced with smooth wire.

WIWS technicians installing fladry on a beef farm in Douglas County, WI



A difficult fladry project on 400 acres for cattle protection in Eau Claire County, WI. Photo illustrates the vegetation and spatial constraints of using this tool. Ultimately fladry was ineffective at deterring depredations (photo not related to funding initiative).

First fladry application in Wisconsin, Ashland County, 2004. Wolves were harassing beef cattle. Turbo fladry had not been developed at this point. Fladry was installed exterior to the pasture. Carol Williams, wife of Rick Williams IDWS, manufactured in her basement. Cost was $750 a mile.

Black bear damage to field corn in Sawyer County, WI. Applied abatement is live capture and translocation. Open areas in field represent where bears were feeding on corn.

WIWS Non-Lethal Carnivore Work Summary, 2021				
Type of Project	**# completed in FY21**	**# of cooperators served**	**Linear Distance (yds) or Area (ac)**	**Additional Notes**
Fladry	6	6	7,489 yds	5 projects for beef calves/1 project for stored livestock feed
Range Riding	2	5	2,100 ac.	Extensive use of ATV's to inspect non-lethal abatement that serves as increased human presence on larger pastures (Fornengo & Mikrot)
Permanent fencing	2	5	18,304 yds	Maintenance of two electrified fences (Fornengo & Mikrot) longterm projects (7 yrs)
Electric fencing	(see above)			
Dog Placement				
Harassment				
Visual/Audio deterrents	1	1	1 unit	Scare radio developed by WIWS (Canik)
Outreach Efforts	5	31		Wolf Harvest and Wolf Management Planning Committee/WDNR
Technical Assistance	83	53		Verified livestock depredations where non-lethal abatement recommendations were made to farmer/rancher
Depredation Investigations (non-lethal only)	8	8		Farms/ranches near Red Cliff Lake Superior Band of Chippewa and Oct-Dec 2020
Other				
Black bear agriculture damage	66	66	382 black bears captured/translocated	Farmers provided assistance with black bear depredation to field crops in Price, Rusk, Sawyer, & Taylor Counties
Loaning Energizer/electric fencing for black bears	132	132	672 Apairies Protected	Energizers loaned for electric fences/Apiaries/Wildlife Damage Abatement and Claims Program

WYOMING

United States Department of Agriculture

Marketing and Regulatory Programs

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2021 Wyoming Nonlethal Initiative: End of Season Report

Overview

For 2021, Wildlife Services – Wyoming (WS-WY) was able to support two full-time-seasonal Biological Science Technicians to specialize in nonlethal conflict prevention of large carnivores from May through September. Now in the second year of this program, WS-WY once again collaborated with Wyoming Game and Fish Department (WGFD), along with several cooperators, to identify how to best tailor the 2021 nonlethal program to achieve the greatest efficacy in preventing lethal removal of large carnivores throughout the state. Based on this feedback, emphasis was once again placed on the construction of electric fences to mitigate black bear (*Ursus americanus*) and grizzly bear (*Ursus arctos horribilis*) damage around apiaries, as well as poultry and goat operations.

Although fence construction was the emphasis of the 2021 WS-WY nonlethal program, both specialists also participated in range riding efforts as well. Up to this point in time, producers throughout the state have been skeptical a range rider program. It has been communicated that this is largely due to negative experiences in the past with range riders that had non-governmental organization (NGO) ties. Despite this longstanding skepticism amongst producers, WS-WY was able to make significant progress this year, garnering the support of producers to allow WS-WY to send two range riders into the Upper Green River to ride 4 different allotments toward the end of the 2021 season. Subsequently, this aspect of the WS-WY nonlethal program is rapidly growing, with the Upper Green Grazing Association requesting 2 full-time range riders (May-September) for the 2022 season. Additionally, the Teton National Forest, and the Yellowstone Ecosystem Subcommittee have also expressed significant interest in seeing this aspect of the WS-WY nonlethal program grow as well.

Summary of Accomplishments

- WS-WY specialists completed 19 permanent fencing projects. 17 of which were 100% funded by the WS-WY nonlethal program, to protect apiaries, poultry, and goats against Black Bear and/or Grizzly Bear depredation. These projects were identified by WGFD as locations of either current or historical depredation.
- Materials for an additional 6 permanent electric fences were also provided by WS-WY to a producer with several apiaries that was experiencing chronic depredation by Black Bears. (In typical WY fashion, the producer didn't want a "complete handout" and agreed to provide the labor if we could provide materials).

- WS-WY nonlethal specialists also completed an additional 2 temporary fences, and 2 permanent fences (materials provided by WGFD) in response to chronic conflicts with “Grizzly 399” and her 4 cubs around Jackson, WY.

“Grizzly 399” with her 4 cubs, is perhaps, the most famous grizzly bear in the world. WS-WY nonlethal specialists completed 4 different fencing projects to prevent and mitigate conflicts with “Grizzly 399”, as she and her cubs wandered around the vicintiy of Jackson, WY searching for food this summer.

- WS-WY nonlethal specialists spent 10 days range riding in the Upper Green, covering 4 different allotments. During this time, WS-WY nonlethal specialists located 2 carcasses, and assisted in locating an injured calf. Subsequently, dead/injured livestock were reported, and ensuing depredation investigations were conducted by WGFD personnel.

Night surveillance utilizing thermal binoculars have proven incredibly beneficial for WS-WY nonlethal specialists in preventing conflicts. Left: a grizzly bear working its way toward cow-calf pairs in an area of frequent depredation events. Right: 4 coyotes attempting to separate a calf from the mother cow in an area of frequent wolf conflicts. In both instances, WS-WY specialists were successful in deterring the predators.

Budget Analysis

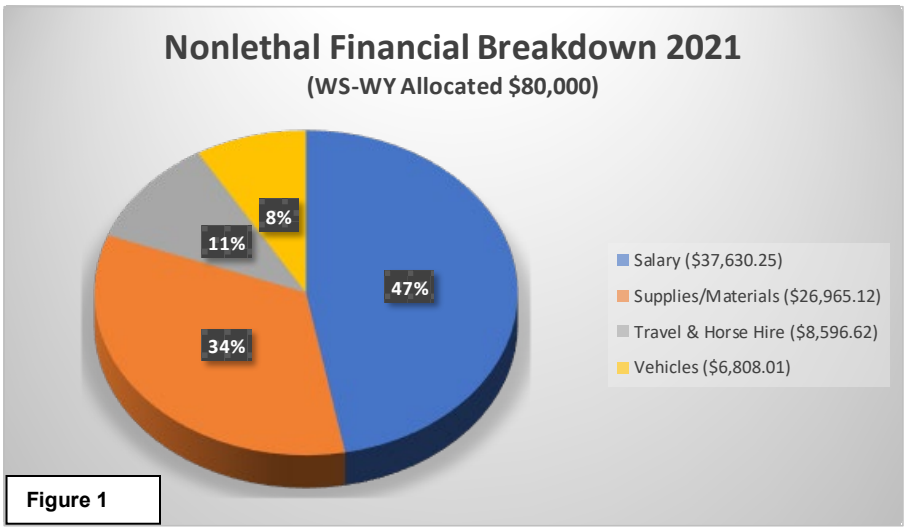

Figure 1

For 2021, WS-WY received $80,000 to conduct its nonlethal program. As detailed in Figure 1, supplies and materials (primarily fencing materials) were the largest expenditure, aside from salary, and accounted for more than 1/3 of the overall budget. By mid-August, WS-WY had exhausted this portion of the budget and had deployed 100 % of available inventory for permanent electric fences; thus, some projects had to be postponed until 2022. As such, WGFD provided the materials for an additional 2 permanent fences, which WS-WY nonlethal specialists successfully constructed in response to ongoing conflicts with "Grizzly 399".

Time Allocation

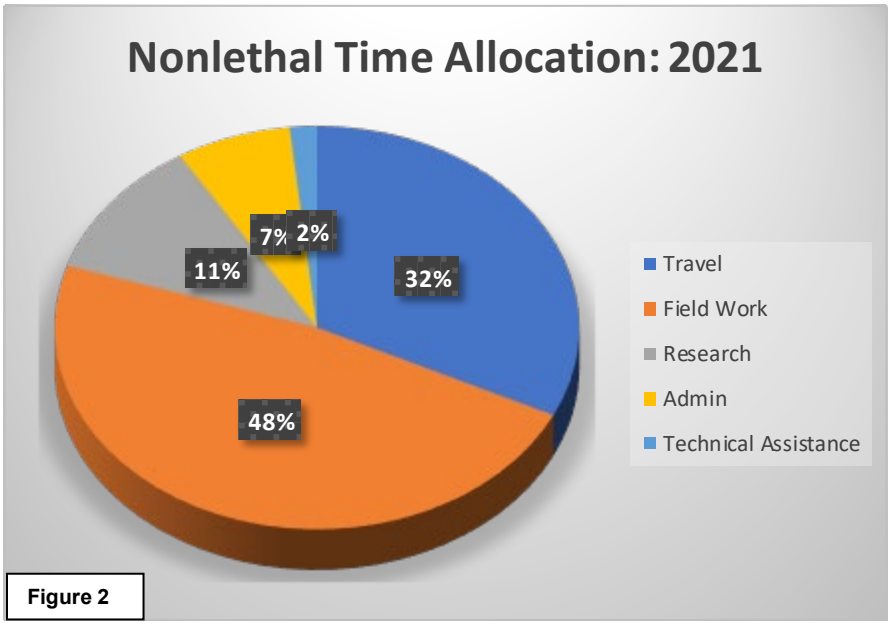

Figure 2

As detailed in Figure 2, field work accounted for the majority of WS-WY nonlethal specialists' total time; however, time allocated toward travel of WS-WY nonlethal specialists was significant, at 32%. Unfortunately, current funding levels, in conjunction with the vast landscape of Wyoming, preclude more efficient time utilization of nonlethal specialists. In 2021, WS-WY nonlethal specialists responded to requests for assistance from Cody, to Rock Springs, to Douglas, and all the way up to Sheridan; or, an approximate area of 27,415 square miles. Both specialists spent the entirety of the 2021 season living in RVs, in order to be mobile for the sake of efficiency in minimizing travel time; however, as indicated in Figure 2, this remains a significant obstacle with current staffing levels. While WS-WY would like to see less time spent on travel, logistically, this could only be accomplished through hiring additional nonlethal specialists (ideally 4, instead of 2).

Conclusion

2021 marked the second year of the WS-WY nonlethal program. Although the nonlethal program is still in its infancy in the state of WY, cooperator support is rapidly growing, making funding the primary limiting factor for program expansion. Current funding levels ($80,000) will support two full-time-seasonal specialists from May through September for ongoing fencing projects; however, there is currently enough support to readily add two additional specialists with an emphasis on range riding from May-September, provided additional funding can be secured.

Please see Table 1 (attached) for a complete summary of projects completed in the 2021 season.

Table 1. WS-WY 2021 Projects

Type of Project	# completed in FY21	# of cooperators served	Any additional notes
Fladry	N/A	N/A	0% deployed. 2 miles in inventory.
Range riding	5	3	10 days – 214 hours Bridger-Teton NF 2 Days – 8 hours Shoshone NF
Permanent fencing	19 (+ materials provided for 6 more)	10	Approximately 1,216 yds. Based on 48'X 48' average (+ 384 yds material provided) 100% inventory deployed
Electric fencing	2	2	200 yds (30% inventory deployed)
Dog placement	N/A		
Harassment	2	1	Night hazing
Visual and/or audio deterrents	N/A		
Outreach Events	N/A		
Technical Assistance	N/A	7	
Depredation Investigations	0 – see notes	2	WS-WY nonlethal specialists detected a total of 3 incidents; WGFD conducted Depredation Investigation.
Other (Research)	3	3	As time permitted (i.e. bad weather), nonlethal specialists assisted in Wolf-Livestock Interaction Study (Clint Atkinson). This consisted of fitting cattle w/ gps ear-tags, collecting gps caches, and surveillance for 3 producers.
Total	37	16 (12 New Cooperators)	N/A