Citizen Wildlife Monitoring Project 2009 Spring-Fall Field Season Report

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Appendices on monitoring conducted in the Olympic National Forest and Colville National Forest were written by Betsy Howell (Olympic National Forest), Kristeen Pilgrim and Michael Schwartz (USFS Rocky Mountain Research Station)

Images on cover (clockwise from top left): Volunteers checking camera at Stevens Pass, black bear cubs at Kendall Peak, volunteers preparing to install a camera at Amabalis Mountain near Interstate 90, and moose on British Columbia side of the Pasayten River drainage.

Cascades Citizen Wildlife Monitoring Project partner organizations:



Conservation Northwest conducted monitoring in the Olympic and Colville National Forest in coordination with agency biologists.

Table of Contents

I.	Executive Summary	
II.	Project Overview	
IV.	CCWMP Methodology	
V.	CCWMP Results	
VI.	CCWMP Discussion	
	Results special focus: Methow wolf pack cameras	
VI.	Recommendations for Next Year	
VII.	Acknowledgements	
APF	PENDICES	
App	endix A – Report: Fisher Surveys on the Olympic National Forest	
Appendix B – Report: Colville National Forest Lynx (Lynx canadensis) Survey		
App	endix C – CCWMP 2009Lures	
App	endix B – CCWMP Sample monitoring protocol	
App	endix C – CCWMP Sample remote camera data sheet	
Арр	endix D – CCWMP Photos	

I. Executive Summary

In 2009, Conservation Northwest's Citizen Wildlife Monitoring Project conducted monitoring efforts in the Olympic National Forest, Colville National Forest, and throughout Washington's central and north Cascades. We piloted a small effort to have volunteers monitor the successful reintroduction of fishers in the Olympic Peninsula in close coordination with the Olympic National Forest, Olympic National Park, and Washington Department of Fish and Wildlife. In northeast Washington, we hired an intern to conduct focused hair snare and remote camera research to detect the presence of lynx on the Colville National Forest. Finally through the existing Cascades Citizen Wildlife Monitoring Project we conduct in coordination with Wilderness Awareness School and I-90 Wildlife Bridges Coalition, we dedicated our greatest resources to recording wildlife presence in key connectivity areas and detecting the presence of rare species throughout the central and north Cascades.

In the Olympic National Forest, two teams placed five remote cameras into the Buckhorn Wilderness along or near the Gray Wolf River. Thousands of images were recorded on these cameras. We did not obtain photos of females and kits together but we did document two different uncollared kits, born either this year or last year, as well as we believe three different radio collared animals. Background information and results from this pilot effort are reported by Betsy Howell of the Olympic National Forest in Appendix A. Discussion of recommendations for continued work in the Olympics is included later in this report.

During the summer of 2009 on the Colville National Forest in coordination with forest biologists, our intern Dagmara Deren conducted two sets of transect surveys for lynx on the Kettle Crest south and north of Sherman Highway. Lynx once occurred on the Colville National Forest in numbers sufficient enough for it to be considered the second most important lynx area in Washington. Since the 1980's lynx numbers have dropped dramatically, and few have been recorded on the forest. Across the US scientists have collaborated on an established protocol to survey for lynx that takes advantage of the species habitat of rubbing like most members of the cat family. Lure and modified combs that act as hair snares were deployed along the two transects, and checked in 14-day intervals. Hairs collected on the combs are submitted to labs for identification. No lynx were recorded during these surveys. A report of lab results from testing the hairs was prepared by the USFS Rocky Mountain Research Lab and is in Appendix B.

From April through October of 2009, our largest effort with remote cameras was underway in the central and north Cascades. The results of the field season expanded what we know about the location, presence, and movement of wildlife in Washington's Cascades, from bears to elk. This season's highlights included images of the second litter of wolf pups born to the Methow wolf pack in the Okanogan as well as a rare Cascades red fox in the Teanaway.

A joint effort between Conservation Northwest, I-90 Wildlife Bridges Coalition, and Wilderness Awareness School, the Cascades Citizen Wildlife Monitoring Project

marshaled 93 volunteers and more than 2,500 volunteer hours to capture thousands of wildlife photos from motion-sensitive cameras at 27 remote locations.

Two areas received primary focus in the Cascades: habitat around Interstate 90 (I-90) east of Snoqualmie Pass and remote core Cascades habitat north of the pass considered vital to rare carnivores, like the North Cascades grizzly bear, in our state. This year we also placed our first cameras in British Columbia, expanding the project across the border to document transboundary wildlife. Building off the work of 2008, our citizen science methodology was refined in 2009 and we became more proficient at selecting camera locations to target specific animals, including wolverine and grizzly bears, and to strategize according to their natural history.

Overall, the Cascades effort this year documented many common species and several uncommon and rare species. Some remarkable photos include persistence of the gray wolf pack in the Methow area, a Cascades red fox in the Teanaway, a pine marten at Stevens Pass, and a series of photos capturing what appears to be an adult and subadult bobcat together. Some wildlife of interest was a snowshoe hare in the upper Teanaway and a golden eagle on the British Columbia side of the Pasayten.

With the help of our camera results, biologists were able to piece together movement and activity of the Methow Valley wolves, the first confirmed reproducing wolf pack in Washington in 70 years, and this report includes a special wolf results section.

We also helped confirm that the forests near I-90 at Snoqualmie Pass are important habitat well visited by wildlife and areas near the pass, including Gold Creek, are indeed part of a major I-90 corridor for wildlife movement and habitat connectivity north to south in the Cascades. This work complements the larger scientific work needed for the I-90 Snoqualmie Pass East Project by the Washington Department of Transportation. The project spans 15-miles from Hyak (just east of Snoqualmie Pass) to Easton and includes measures to make the roadway safer for motorists and wildlife. Our project work coincided with the beginning of construction of wildlife crossings for I-90.

The methodology and full results of monitoring in the Cascades making up a majority of the content of this report.

The work of the Citizen Wildlife Monitoring Project in the Olympic National Forest, Colville National Forest, and Cascades illustrates the priceless contribution that citizen science by volunteers makes to the management and conservation of Washington's public lands and wildlife.

II. Project Overview

Conservation Northwest's mission is to protect and connect the wildlife and wildlands from the Washington Coast to the BC Rockies. We have utilized citizen science through remote cameras as a means of fulfilling our mission for nearly a decade. Based on our conservation priorities we set objectives for our citizen monitoring efforts at the beginning of each year. Our 2009 priorities included:

- Bringing capacity to agency efforts to monitor fishers in the Olympic peninsula following our close coordination with agencies for their re-introduction.
- Detecting the presence of lynx in northeast Washington to inform recovery and management.
- Detecting the presence of rare species in the Cascades such as wolverine, gray wolf, and grizzly bear.
- Recording presence of wildlife in key connectivity areas such as the I-90 Snoqualmie Pass East Project.

Following these priorities for 2009, we initiated efforts in collaboration with agency biologists in the Colville and Olympic National Forests to monitor fishers and lynx. Details on these efforts are provided in the appendices. Then, we worked within the existing Cascades Citizen Wildlife Monitoring Project (CCWMP) to meet our objectives in this landscape. The structure, specific objectives, methodology, and results of this work are discussed in this report.

CCWMP Organizational description and objectives

The Cascades Citizen Wildlife Monitoring Project is a joint effort between Conservation Northwest, I-90 Wildlife Bridges Coalition, and Wilderness Awareness School to conduct citizen wildlife monitoring in Washington's Cascade Mountains. The monitoring project, formed in the winter of 2007, is the latest joint monitoring effort in the state. It continues an earlier monitoring program begun in 2000, when Conservation Northwest, in coordination with the Washington Department of Fish and Wildlife, operated the original Rare Carnivore Remote Camera Project to monitor for the presence in Washington of rare and elusive species like wolverine and grizzly bear.

The CCWMP has four main program objectives within the Cascades:

1. To engage and educate citizens on wildlife monitoring in the critical habitat areas

2. To record wildlife presence along Interstate 90 in strategic locations and in core habitat through remote cameras and snowtracking

3. To record the presence of rare and sensitive species that conservation efforts aim to recover and the I-90 Project hopes to connect habitat for, including wolverine, gray wolf, and North Cascades grizzly bear

4. To facilitate exchange of information on Cascade wildlife, including data from monitoring efforts, between public agencies, organizations, and interested individuals

Description of the two strategies

During the 2009 field season, cameras were placed according to two distinct strategies:

1. Core habitat monitoring: Placement of cameras in remote core habitat areas in the Central and North Cascade Mountains in an effort to document elusive predators, and 2. I-90 monitoring: Placement of cameras along Interstate 90 east of Snoqualmie Pass in an effort to understand the impact of the interstate highway and to support efforts to provide safe passage for wildlife and people.

Core habitat cameras

This year, cameras were placed in remote areas of core habitat in Washington's Central and North Cascades, and in south-central British Columbia, Canada. Core habitats were defined as areas of public lands with large blocks of habitat relatively removed from roadways and other disturbance: often roadless, wilderness, or national park landscapes. Each camera placed had a species-specific focus which determined the camera location, the scent utilized, and the background information provided to volunteers. The Methow Valley cameras that were focused on monitoring a specific pack of wolves are lumped into this category, although we recognize that they may not fit this definition at all times. Conservation Northwest provides direction and coordination for the placement of these wolf-oriented cameras.

I-90 cameras

For the past three years, the I-90 Wildlife Bridges Coalition and Wilderness Awareness School have coordinated citizen monitoring efforts in habitat just north and south of Interstate 90, east of Snoqualmie Pass. The monitoring is done to catalyze and complement the larger scientific work needed for the I-90 Snoqualmie Pass East Project, in which the Washington Department of Transportation has begun expanding Interstate 90 from four to six lanes. The project spans 15-miles from Hyak (just east of Snoqualmie Pass) to Easton and includes measures to make the roadway safer for motorists and wildlife.

The highway expansion project identifies 14 connectivity emphasis areas, where improvements are proposed to protect waterways and to allow safer passage for wildlife under or above the roadway. Over the past three years, citizen monitors have collected wildlife presence data at some of the locations where crossing structures are proposed using a combination of cameras and snowtracking transects. During the camera monitoring season this year, the Washington State Department of Transportation broke ground on construction of the first 5-mile phase of the highway expansion which stretches from Hyak along Lake Keechelus and includes a wildlife underpass at Gold Creek.

I-90 Wildlife Bridges Coalition provides the direction and coordination for year-round monitoring work in habitat along the I-90 Project. Wilderness Awareness School, an environmental education organization, trains volunteers on wildlife signs to guide their camera placement during the spring and summer while playing a lead role in training and guiding volunteers in the field for snow tracking in the winter. The goal of the snowtrack transects are to document wildlife presence in the vicinity of the future wildlife crossing structures planned as part of the I-90 Snoqualmie Pass East highway widening project. The results of the snowtracking surveys are not within the scope of this report: results are reported in the spring 2009 and can be found at http://www.conservationnw.org/northcascades/cascades-citizen-wildlife-monitoring/

CCWMP Timing

The annual cycle of monitoring in the Cascades project runs from April to April. In April, we launch the largest portion of our remote camera program with trainings and deployment of cameras that remain in the field until early October. In November, we shift our main focus to the winter snow tracking program that runs through March. During winter months, we strategically deploy a limited number of remote cameras with a specific species focus. In addition to our program, we lend cameras to ongoing professional scientific monitoring in the Cascades to make the greatest use of our equipment. A report generated in April shares the results of our winter snowtracking and camera program, and a December report shares the results of our spring/summer remote camera program.

This season, we timed the installation and removal of remote cameras based on each camera sets species or location focus.

III. CCWMP Methodology

Remote cameras are used for this program because photographic evidence is a relatively easy, verifiable method of documenting species presence and adding to geographic distribution data of species, while achieving our objectives as listed above. In comparison to extensive wildlife surveys, they are a low-cost way that a volunteer workforce can engage in wildlife monitoring and contribute to scientific knowledge and conservation efforts without intensive biological survey training.

In determining the objectives and scope of the program for 2009, part of our process was based on limitations presented by the equipment and processes that we use. For example, we can document species presence in an area at a specific time and perhaps add to geographic distribution data, but we cannot demonstrate species absence. Additionally, our cameras are not geographically distributed in a manner that would enable us to draw any statistical conclusions such as population estimates or visit frequency, nor are we attempting to make such conclusions.

Camera locations and species focus

Following last year's recommendations and analyzing priorities for 2009, we decided this season to place a large focus with our remote cameras on detecting the North Cascades grizzly bear while maintaining some cameras dedicated to other species and locations. Prior to reaching a final decision on our priorities of focus for the season, we consulted our advisory council by phone to identify their priorities for additional monitoring and seek feedback on specific locations based on our shared priorities.

The advisory council for our project consists of agency biologists, wildlife experts, and project partner representatives who contribute time to offer scientific guidance to our program and ensure close coordination with the ongoing scientific studies in our project area. We bring the advisory council together by phone twice a year to collectively provide feedback on our efforts and guide the upcoming season. We also use email and one-on-one contact with our advisors to inform them of our efforts and gain individual advice. In 2009, we were fortunate to have advisory council representatives from all of our project partner organizations, as well as the Grizzly Bear Outreach Project, WA Department of Fish and Wildlife, US Forest Service and the Forest Service's PNW Research Station, US Fish and Wildlife Service, North Cascades National Park, and Western Transportation Institute.

Prior to the '09 field season, we conducted a review of past remote camera locations, reports of sightings of target species, species habitat analysis, and important connectivity measures proposed for the I-90 Snoqualmie Pass East Project; held an advisory council phone discussion; and conducted informal interviews to generate a pool of potential camera locations. To winnow the list of potential camera sites, we used estimates of the likelihood for success, feasibility of the locations, and presumed impact of the results.

Camera locations and their target species, and our protocols, including those pertaining to the use of lure, were all amended following recommendations from our 2008 season and developed with and approved by our advisory council prior to the field season. The number of camera locations this year was determined by dedicating two cameras to each predetermined location, while allowing for a set of at least four cameras to remain in our office for rapid response to wildlife sightings reported during the season.

Core habitat cameras

A total of 42 cameras, 2 cameras at each of 21 locations, were allocated to core habitat areas: 38 cameras were assigned to predetermined areas and 4 cameras reserved as "responder" cameras that were deployed in response to reported sightings of rare species.

Some core habitat cameras were placed full season in the field from March to October (approximately eight months). Other core habitat cameras were placed in the field for a half-season of approximately three months, during either early season (late spring-early summer) or late season (mid-summer-early fall).

The half-season cameras were in the field for shorter periods of time for one or more reasons. Accessibility to the location was a limited factor for a few locations. But target species was another factor. For many of the cameras, the target species would have only been in the location for a short period of time.

For example, wolverines prefer to live near snow along timberlines. Early in the year, cameras were placed close to snow and wolverine habitat. After the snow has melted, wolverines are much less likely to be in the location with the camera. Similarly, grizzly bears are generally found where there is an abundance of food. In the early to

midsummer, they often feed on berries. Cameras were set in locations that are known to produce a large number of berries. Therefore, many of the early-season cameras targeted wolverine and the late-season cameras targeted grizzly bears. In some locations, these two conditions overlapped, and so it was logical to leave a camera in the same location for the entire season.

Year-round and early-season camera sets were installed as soon as access allowed following our April trainings, with removal of the early-season cameras by end of June. Late-season camera sets were to be installed in early July, with removal of all cameras remaining in the field by early October. (*Table 1 shows all actual core habitat camera locations and dates.*)

To decide where to place the assigned core habitat cameras, we selected and prioritized three target species: grizzly bear, wolverine, and grey wolf. Highest priority was grizzly bear and high-quality grizzly bear habitat received the most cameras. Wolverines were second priority and cameras to document them were placed where this biggest of the land-dwelling members of the weasel family is suspected to live, but not yet confirmed. Wolves were next priority, and our focus was the Methow Valley wolf pack, which our cameras confirmed first in the state in 2008. We coordinated with the Washington Department of Fish and Wildlife to redeploy our cameras to areas of recent, probable wolf sightings.

Table 1. Core habitat area remote cameras were placed in areas we reasoned had the most chance of capturing images of grizzly bears, wolverines, and wolves. Cameras were moved to new locations to match seasonal movements of the target animals when snowpack conditions allowed access.

Location	Target Species	Time Period (2009)	Lure(s)	Camera Model
Crater Moraine	Wolverine	6/13 - 10/3	Hawbakers 600; Ultimate Bear Lure; Fish Oil	Cuddeback
Methow Valley	Gray wolf	2/1 - 10/11		
Teanaway1	Grizzly bear	5/30 - 10/11	Hawbakers Long Distance Call 600; Silent Partner; Canine Call; Beaver Castorium; Ultimate Bear Lure; Fish Oil	Reconyx; Cuddeback
Teanaway2	Wolverine	5/31 – 10/21		Reconyx; Cuddeback
Stevens Pass	Location based, general wildlife target	4/25 – 9/26	Silent Partner; Long Distance Call; Beaver Castorium; Gusto; Fish Oil	Reconyx; Cuddeback
Manastash	Gray wolf	4/26 - 9/2	Carman's Superior Animal Lures: Canine	Reconyx

			Call	
BC Pasayten	Wolverine; Grizzly bear	11/28/2008 – 10/9/2009	Red Fox Urine	Cuddeback
Kendall Peak	Wolverine	6/9 – 10/3	Long Distance Call 850; Silent Partner; Beaver Castoriun; Fish Oil	Reconyx
Shuksan Arm	Wolverine	4/26 – 6/29	Hawbakers Long Distance Call 600; Beaver Castorium	Cuddeback
Mesahchie	Grizzly bear	7/11 – 9/24	Ultimate Bear Lure; Canine Call; Silent Partner; Beaver Castorium	Cuddeback; Leaf River
Desolation Peak	Grizzly bear	8/3 – 9/26	Canine Call; Beaver Castorium; Ultimate Bear Lure; Fish Oil	Reconyx
Fisher Creek	Grizzly bear	6/23 – 10/7	Ultimate Bear Lure; Fish Oil	Reconyx
Thunder Creek	Grizzly bear	5/28 - 6/29	Ultimate Bear Lure; Fish Oil	Cuddeback
Napeequa	Grizzly bear	8/2 - 9/20	Sardine Oil; Anchovie Oil	Cuddeback
3 Fools Pass	Grizzly bear	7/18 – 9/5	Ultimate Bear Lure; Fish Oil	Reconyx
Chilliwack	Wolverine	4/29 - 6/1		Reconyx
Sauk Mt.	Wolverine/Grizzly bear	5/30 - 7/1	Beaver Castorium; Fish Oil	
Mt Baker	Wolverine	6/6 – 6/28	Beaver Castorium; Silent Partner; Sardine Oil	Cuddeback
Icicle Creek	Wolverine	4/24 - 6/10	Silent Partner; Beaver Castorium; Sardine Oil	Cuddeback; Leaf River

Four additional cameras were also maintained as "responder" cameras for varying lengths of time to be deployed throughout the season, to either quickly follow up on potential sightings of rare species, when determined to be credible by staff or the advisory council, or to experiment with newly identified opportunities or needs for citizen science to be pursued in greater detail in the 2010 season. The responder camera sites were:

- Suiattle drainage, wolverine
- Highway 20 / west Cascades, grizzly bear

I-90 cameras

Eleven cameras were placed along I-90. Camera placements complemented ongoing research in the highway corridor by the Western Transportation Institute and its partners

while building upon data that we have gained in past year's year-round monitoring. This year we elected to move camera sites farther away from the highway in several locations to hopefully detect different species than those directly next to the roadway. We also amended the camera locations in the Rock Knob camera set to allow for monitoring on both sides of the interstate. (*Table 2 shows all actual I-90 camera locations and dates.*)

All the cameras located along I-90 just east of Snoqualmie Pass shared the broad objective of documenting species presence in this critical habitat connectivity and wildlife passage area. Some of the cameras were targeted at documenting specific species we hope to record within the I-90 corridor.

Table 2. Cameras placed near Interstate 90 to document species presence in acritical wildlife corridor. This table demonstrates each location's detailed information.

Location	Number of	Description	Time Period	Lure	Camera Model
Location	Cameras	Description	(2009)	Luit	mouth
Hyak	2	Forested areas south of Interstate 90 at the easternmost portion of the Summit at Snoqualmie ski area	6/13 – 10/11	Silent Partner; Fisher; Beaver Casotirum; Gusto; Anchovy Paste; Fish Oil	Moultrie
Rock Knob	2	One on either side of the interstate at the site of the proposed Rock Knob overpass	5/3 - 10/3	Silent Partner; Long Distance Call 600; Bacon Fat; Silent Partner; Beaver Castorium	Cuddeback; Moultrie
Gold Creek valley	2	Key connectivity point where wildlife underpass is being constructed. Further up the valley from the Interstate than in past years.	6/6 – 10/4	Lynx Cat 265; Trails End; Gusto; Fish Oil	Cuddeback; Reconyx
Forested island between I-90 near Easton	1	Placed in a forested island between the east and westbound lanes of I-90 just west of Easton, where crossing structures are proposed for construction.	4/26 - 10/3	None (Lure was not used at this location to reduce the risk of attracting animals across the interstate.)	Reconyx
Mount Margaret	2	Targeted location for potential wolverine and/or pine marten habitat.	5/30 – 10/10	Schroeder's Fisher #1	Cuddeback
Amabalis Mountain	2	Targeted location for potential wolverine and/or pine marten habitat.	5/17 - 9/24	Sweet Raccoon Muskrat' Fisher; Marten	Cuddeback; Moultrie

Equipment: cameras and lures

Cameras

We used Moultrie, Cuddeback No-Flash, Leaf River, and Reconyx RC55 and RC60 motion-sensitive digital cameras.

The Moultrie models are our oldest digital cameras that allow both still images and short video recordings; but they lack infrared capability and use flash during low-light hours, which can startle wildlife. We used these oldest, flash cameras for I-90 placement, where we expected more common or known wildlife such as deer, elk, and black bears, and newer, infrared models for core habitat, more remote locations, and targeted species. The Cuddeback No-Flash model was the model we purchased in larger numbers for the 2008 season based on a balance between price and desired features. It has infrared capability and takes high-resolution color photos during the day and grayscale images between dusk and dawn. The camera setting also allows for video recording of various lengths, which is followed by a still photograph. This year, we encouraged volunteers to use the video setting as it overcomes the long delay between photographs, the major challenge we identified with the model last season.

We focused the use of the Cuddeback models along Interstate 90 camera sets, where we did not anticipate the need for species identification as much as the remote locations for the same reasons as listed above, but several of these models were also deployed in remote locations as well. Cuddebacks were generally screw-mounted to a tree, with sometimes a bungee cord added for stability.

Following lessons learned from last year's results, all new cameras purchased for this season were Reconyx models: one Reconyx RC55 (roughly \$530) and six Reconyx RC60 models. These "RapidFire" cameras have very short delays between photographs and advanced settings that allow us to set how many shots are taken in immediate succession each time the camera is triggered. This feature allows us a much better opportunity to identify a species, or even an individual, that approaches the camera station, and is particularly useful in our non-scented camera location in the I-90 median, where triggers are expected to be less frequent and visits shorter. Reconyx cameras were mounted to trees using bungee cords placed through the handles on the sides of the camera, and camera angles repositioned as needed by using branches as wedges. These models were our first selection for all grizzly bear cameras when possible, followed by other remote locations.

We invested in locks for cameras this season to avoid the several thefts that plagued last season's monitoring. No equipment was lost to theft this season.

Lures

Prior to the season, we researched lures that were both general attractants as well as those available to specifically attract target species. Beyond the effectiveness of the scent, we sought information and opinion on the amount of lure to use, lure use in specific locations (e.g., in close proximity to highways or ongoing scientific research), and whether a single lure or combination of lures was more effective. We reviewed our use of lures in past seasons, interviewed researchers who use lures in their work, consulted our advisory council, and reviewed literature to guide our approach to selecting scented lures. We found a wide range of effective attractants, and identified that a targeted and measured approach to lure use and documentation was needed and that documenting which lure was used where and to what effect was important.

During our first year of monitoring, volunteers affixed bait, usually sardines, along with lure attractants. This year, we excluded the use of bait in our 2009 Cascades program, both to protect volunteers from potentially dangerous animals like bears, and to favor less invasive monitoring methods and minimize the chance of accustoming wildlife to people and food handouts. In this decision, we recognized the strong advantages of bait in prolonging an animal's time spent at a camera station, likeliness for return to the station, and potential additional draw of species for an initial visit to the station. We plan to revisit this decision with our advisory council for future seasons of the program.

We used a variety of lures, mostly commercial scent attractants ordered from trapping supply businesses, selected for each site based on species targets. Most often we applied a single lure to each camera location, with one location where we determined we would use no scent at all and a set discussed later in this report that dropped the use of scent during the season. As mentioned previously, the unscented location was located in a forested island in the middle of the I-90, where we did not want to attract wildlife or give them reason to return. Lure use was recorded at each application in the field for our records. (*See Appendix A for a list of lures.*)

Logistics

Protocols, field procedures, and processes

The field program is run almost entirely by volunteers and is supported by several staff from participating organizations.

Protocols and data sheets were created to define our processes, ensure consistency in our program, engender credibility, provide a written guide to help volunteers in the field, and channel data and communications flow thoughtfully and efficiently. We reviewed our protocols used during the snowtracking season and prepared protocols for our remote camera work specific to the camera models. (*See Appendix B for a sample monitoring protocol and Appendix C for a sample remote camera data sheet.*)

The appendix contains a Species Priority List for 2009, a means of grouping wildlife into priority levels based on the significance of a species being recorded by our project. In general, species were given a higher priority if they were judged:

- Significant to science, such as North Cascades grizzly bears, or significant to the scope of the project. Our project is focused on rare carnivores, including wolverines and grizzly bears;
- Less common, with low populations in the project area, such as mountain goats;
- Already the focus of ongoing agency studies, such as wolves and fishers.

For 2009, the priority list was slightly modified from the list used by our winter snow tracking teams to better reflect the geographic scope of our remote camera work, while attempting to provide consistent data collection and analysis between the snow tracking and camera aspects of the program. The winter snow tracking program is focused entirely along I-90, and therefore has a different expectation of the wildlife likely to be recorded.

The wildlife expected along a highway through developed lands are different from those that live in the backcountry woods. The likelihood of seeing a mountain goat or a wolverine is near impossible near the locations along Interstate 90. Also, there are some animals that migrate south before winter and would be less likely to be seen during the winter snow tracking months.

In our 2009 Species Priority listing, Level 1 species are the highest priority and Level 3 species the lowest. According to protocol, teams are to contact program staff as soon as possible upon signs, sightings, or photographs of Level 1 species. Level 1 species included wolverine (*Gulo gulo*), fisher (*Martes pennanti*), lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos*).

Level 2 species included cougar (*Puma concolor*), marten (*Martes americana*), mountain goat (*Oreamnos americanus*), elk (*Cervus elaphus*), deer (*Odocoileus* sp., we did not identify deer to species this year), and mountain red fox (*Vulpes vulpes*). Level 3 species included black bear (*Ursus americanus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), snowshoe hare (*Lepus americanus*), and smaller animals. Although cougar may not be a Level 1 species, it is a species of great interest within the I-90 corridor.

This Species Priority listing is kept to maintain as much consistency in data recording as possible with our winter snow tracking program along Interstate 90, which remains a constant list. The animals expected in the same location during the same season from year to year are going to be more consistent than the entire list of possible animals during all seasons in the backcountry forests. Therefore, there is a bias to the species ranking toward animals which are found on developed land in the winter to that specific location.

Procedures were set up to provide general direction from our office, while affording flexibility to each team leader. Field days for the installation, checks, and retrieval of cameras were selected by team leaders and members, based on volunteer availability and the weather. Cameras were checked approximately every four weeks to change camera batteries and memory cards and refresh the lure. All team members were encouraged to participate in the camera installation (or alternatively to later accompany someone on a check that had been on the install), so that each team member would be able to find the camera site at the time of their scheduled check. Each camera team was allocated a GPS unit to record the cameras' GPS coordinates and any other coordinates relevant to wildlife sign or location. Volunteers also used standardized data sheets.

IV. CCWMP Results

Overall, the project this year documented many common species and several uncommon and rare species. Some remarkable photos include a Cascades red fox in the Teanaway, persistence of the gray wolf pack in the Methow area, a pine marten at Stevens Pass, and a series of photos capturing what appears to be an adult and subadult bobcat together. Some species of interest were snowshoe hare at Teanaway2, golden eagle at the British Columbia Pasayten, and a hummingbird at Napeequa. Also, photos of flying squirrels were taken at several locations, accounting for a significant portion of the squirrel group. (*See Appendix D for a sampling of photos.*)

The data are split into several groups: Core Habitat, Responder, and I-90 cameras. The core habitat cameras were further divided into full season and half season (early and late) recording. We prepared charts of species abundance (the number of distinct individuals at each location). Events are defined as a series of successive photos in which the same animal or group of animals appear. An animal was assumed to be the same individual if there was a photograph of the same species within a contiguous ten minutes. Individuals and events differ in that an event can include several individuals. For example, if four elk appear in a series of photographs, these represent four individuals but only one event.

The I-90 cameras and about half of the core habitat cameras were in the field for the entire camera monitoring season: March to October. The rest of the core habitat cameras were in the field for shorter periods of time, for reasons previously mentioned. These cameras are different cameras to those in the field for the entire season. The half season cameras were in the field in the early season, March to June, or late season, July to October.

When possible, the exact species name was recorded in the database. But in many of the pictures, the exact species of an animal cannot be determined due to factors including quick movement of the animal, darkness of the photograph, or positioning of the animal, etcetera. For this reason, and for ease of analysis, animals were lumped into categories, including squirrels, chipmunks, deer, birds, rabbits, and mice.

The cameras at the Sauk Mountain and Shuksan Arm locations yielded no results.

The full dataset, including geoposition and exact camera locations, is available by permission only to land and wildlife managers. Please contact Conservation Northwest.

Charts and tables

The charts display species abundance for Core Habitat, Responder, and I-90 cameras at each camera location. Species abundance is defined as the number of individuals of each species at each location. Tables throughout this section demonstrate the differences between species total events and total individuals. The events and individuals differ in that an event can include one or more individuals.

"Total individuals" is a measure of the total number of individual animals detected. For example, one photo of a single elk counts as one individual, one photo of five elk counts as five individuals. If there are multiple images of what appear to be the same animal or group of animals captured within a 10-minute time span, the individual or individuals are only counted once.

Species	Total Individuals over all
	Core Habitat
Bird	53
Black bear	111
Bobcat	20
Chipmunk	85
Cougar	6
Coyote	74
Deer	174
Elk	108
Fox	1
Moose	4
Mountain beaver	1
Mouse	15
Pine marten	18
Porcupine	1
Rabbit	11
Squirrel	57
Unidentified mammal	9
Unidentified rodent	20
Vole	1
Wolf	47

Table 3. Core Habitat: total individuals detected. Multiple photos within a 10-minutetime span are only counted once.







21

Responder Cameras



Chart 4. Species abundance at the responder cameras in the core habitat. These cameras were enabled when a credible grizzly bear sighting was reported in the area.

Table 4. Responder Cameras: Total Events vs. Individuals. Event and individual numbers matched exactly. This shows that the animals in these areas were most likely traveling alone.

Species	Total Events over all Responder	Total Individuals over all Responder
	Cameras	Cameras
Black	14	14
bear		
Deer	15	15
Rodent	1	1
Squirrel	15	15

I-90 Cameras



Chart 5. Species abundance at I-90 cameras. Easton and Gold Creek have the highest numbers of individuals, and the highest diversity. Notably, no lure was used at the Easton location and this camera was located on an "island" in the median of the interstate highway. All individuals at this location have crossed Interstate 90.

Table 5. Interstate 90: Total Events vs. Individuals. Similar numbers of events and individuals are shown for most animals. Elk show the greatest difference between events and individuals.

Species	Total Events over all I-90	Total Individuals over all I-90
	Locations	Locations
Bird	2	2
Black bear	11	11
Bobcat	6	6
Chipmunk	10	10
Coyote	19	21
Deer	21	23
Elk	54	60
Rabbit	1	1
Squirrel	10	10
Unidentified	6	6
mammal		

Notes:

The category "unidentified rodent" in the tables is a grouping of unidentified animals that appeared to be rodents, but for some reason could not be placed into one of the more specific rodent categories. "Unidentified mammal" is a group of unidentified animals that appear to be large animal such as a deer or bear. Often, the animal came so close to the camera that the image recorded an ear or a leg or a muzzle, but not enough of the mammal to be clearly identifiable. The "Rabbit" category includes both rabbits and hares. Domestic cattle and sheep were recorded in the Methow Valley and Manastash, respectively; many of the cameras also recorded domestic dog and non-volunteer human presence. This information, outside the scope of the study, does not appear in the database.

V. CCWMP Discussion

Results of the field season contributed to the knowledge base of species location and presence in Washington's Cascades. Project results also provide an example of the contribution that citizen science can make to inform public land management and conservation. Our abbreviated discussion this year focuses on new lessons learned in our 2009 season, and we refer you to our 2008 Remote Camera Report for a longer discussion of data analysis, efficacy of citizen science, and reflections on methodology including our switch to use of digital equipment.

Camera stations

Probably most significant about our camera stations this year was the expansion of our program in to British Columbia and the initiation of construction during our season on the interstate near our Gold Creek station at I-90. We chose to include new camera stations in British Columbia to recognize the interconnectedness of this habitat for our target priority wildlife. Wolverines, grey wolves, lynx, and grizzly bear do not see a border to the Cascades in this habitat and we were excited to reflect that in our program. However, since this expansion posed logistical problems at the border for our US volunteers, and stations were run by British Columbia volunteers alone.

At Gold Creek, we were halfway through our season when the groundbreaking celebration was held for the I-90 Snoqualmie Pass East Project. Construction has so far had minimal impact to the Gold Creek area and the planned underpass has not had its intended effect on the wildlife in the area. But it signifies a major change in the status of the project our monitoring work has made contributions to. Wildlife cannot cross I-90 safely yet, but will be able to soon, when construction is complete.

Wildlife

The results of species detected this season were as expected in the project area. Of particular interest for the I-90 cameras, it was our first season without detection of a pine marten at Hyak. In all previous seasons of both winter and spring monitoring, we have

recorded a pine marten at this location while snow is still present on the ground. Our comparatively late-season installation may have resulted in this lack of detection.

Moving cameras further from the interstate this year for our I-90 locations did not produce a greater diversity of species. A greater need for pre-season site selection and volunteer training on wildlife species of focus may partially account for these results.

In early analysis of our results, we noted a change in frequency and timing of animal detection and an increase in human detections at our sites as the hunting season begins.

Results special focus: Methow wolf pack cameras

The wolf pack in the Methow Valley was the first confirmed pack discovered in Washington in 70 years. The pack was discovered in May 2008. Our citizen monitoring remote camera photos provided the first hard evidence that the pack existed and that the pack had produced a litter of six pups in July 2008.

The pack is carefully monitored by the Washington Department of Fish and Wildlife and the U.S. Forest Service, which inform and guide our citizen monitoring efforts. The breeding pair has been fitted with radio collars by agency biologists that provide telemetry data of the wolves' locations. Through our program, several remote cameras have been placed by program volunteers to assist in monitoring this pack. Our volunteer team dedicated to this location remains in close coordination throughout the season with agency biologists with the US Forest Service and WA Department of Fish and Wildlife. Due to this close coordination, this special results section combines information that we received from the agency on their telemetry data and monitoring along with our own remote camera team results.

Our camera work in 2009 began in February with remote cameras placed along wildlife trails, resulting in images of the wolves moving through the area. An interesting finding from photos was that the pack appeared to be moving regularly back and forth between two locations about 7-10 miles apart. The remnants of a deer carcass were found surrounded by wolf tracks at one of the locations, almost completely eaten, even the bones had been hauled off, with evidence that individual wolves had dispersed to chew bones. A turkey carcass with similar evidence was also found. Biologists speculate the pack would hunt and eat in one area then travel to the other area for several days while waiting for prey to settle. The pack would often make this move in the very early morning hours during snow storms, conditions which also made them hard to track.

The season began with the use of the same lure that was used in our successful 2008 season, but in early remote camera station checks did not appear to have the same effect. We are uncertain why the same lure did not produce similar effects, but we continued the remainder of the season without the use of lure at our Methow Valley camera locations. We instead relied upon identifying movement corridors. The removal of the use of lure reduced our concern about any conflicts due to proximity of a site to human and domestic pet use, and motorized routes.

On March 10, cameras captured photos of four wolves traveling as a group, this was the last time there was hard evidence of four adults. On March 16, there were three wolves traveling as a group. By early spring there was consistent evidence of just three wolves. On April 8, an agency biologist informing our program volunteers spotted two collared wolves, one of which appeared pregnant, and a 2008 pup. It is not clear if the fourth wolf was still with the pack, but we speculate that it has dispersed or died.

There were no remote pictures of wolves captured in April or May, but telemetry data indicates the collared female denned late March through May, and the pack generally stayed near the den site until late June. During this time, the inexperienced pup and collared male would travel and return regularly; presumably they were hunting and returned to feed the denning female, and, later on, the pups. During denning, lure (Gusto) was used and cameras were set up to capture activity at the water source near the den. The cameras were unsuccessful. As noted above, the lure did not appear to be a strong attractant to these wolves at this time. The lure attracted other wildlife to the cameras and the same lure historically and subsequently lured members of this pack. During this same timeframe, in May, we were notified that a driver almost hit the 2008 pup and took several high-quality photos of the pup and collared male. There is speculation the wolves were eating road kill.

The first evidence of 2009 pups was a July 10 howling survey done by agency biologists where young pups were heard. Subsequent telemetry data showed the female left the den site and travelled about three miles to the first of what we chose as our camera locations for the season. The female and pups had to cross some county and forest service roads during this first move.

From June through August, camera data suggests the 2009 pups spent most of the summer at three general locations fairly close together (we refer to these as camera station sites A, B and C). During this period, telemetry data indicates the collared male would leave for days at a time, ranging widely. The female would leave for day trips but appeared to return each evening. Meanwhile, remote cameras captured images of the pups at our camera station sites. The pups were either left alone or with a "babysitter" wolf, who was likely last year's pup. Wolves were captured by locating tracks and scat and placing cameras along old road and trail clearings.

Here is a summary of the general movements of the pups during this time:

- Camera site A: Cameras capture photos of just one pup at a time, so it remains unclear how many pups are in the litter.
- Camera site B: Telemetry data indicates the collared male moved here a few days prior to the pups moving here around July 25. Howling and photos were captured July 29. While moving the camera on July 30 three small wolf pups are visually spotted. Remote camera photos continue to show only one pup at a time.
- Camera site C: On August 6, the signal of the collared female was detected and pups were heard howling here. Cameras were moved here at that point, most of the photos capture one pup at a time, but a single photo captured two pups. Photos

were captured here until August 17, sometime after which the pack left for the high country.

In an interesting side note at Camera site C, some dropped bungee cords were found chewed to pieces. Careful viewing of video captured by the remote camera revealed a wolf pup making off with a bungee.

In September, agency biologists conducting a mountain goat survey by helicopter located the wolves by telemetry. They saw the collared female, what they believe to be the 2008 pup, and four small pups from the helicopter.

In September and October, the remote cameras were moved to the high country, where telemetry data was used to place cameras and lure (Gusto) was brought back to use as an attractant. One camera was very successful, capturing 20 photos of wolves. The cameras were pulled October 11, prior to modern firearm season. We were made aware of four reports of wolf pack sightings during the deer hunting season: three in general range of the Methow pack and one report of a pack some distance away in the Chelan/Sawtooth.

Differences from last year

- Last year, remote camera images were the first evidence that the Methow pack existed, and subsequently captured images of six pups in one frame. This year our cameras captured images of multiple pups and pups with an adult, but not in these numbers. Early in the season we recorded a photo of two pups, while later in the season we recorded several images of two pups and one image of three pups with an adult.
- Last year, the pack stayed much of their time at a different set of camera locations than this year, showing a difference in selection of sites.
- Last year, the pack left for the high country more than two weeks earlier. It appears the female denned later this year than last year, and perhaps the pups matured later, delaying the pack's departure for the high country.

Differences from other remote cameras

Compared with other project remote cameras, the wolf cameras were checked relatively often, usually once a week. Cameras detected wolves near forest roads making regular checks and moves practicable. This more frequent schedule was helpful to biologists interested in learning how the wolves reacted to nearby human activities, including recreation and livestock grazing.

Equipment

Our season confirmed many differences in the abilities of our camera equipment and different models this year. Following three months of no photo detections at our Gold Creek station on our Cuddeback models, we installed a Reconyx model camera, adding it to the same tree. We checked this station in two weeks, and had multiple images appear on the memory card from the Reconyx but not the Cuddeback. There could have been an individual error with that specific Cuddeback camera, but we did notice greater numbers

of detections and photographs of single detections recorded by our Reconyx models project area-wide. The strong advantage we enjoyed this season with the Moultrie and Cuddeback models was the video feature, which allowed for viewing more information on the behavior of an animal at a camera station.

Several camera teams had difficulty with the camera settings this year, which could be overcome with greater equipment training. For example, the Reconyx allows for a timed setting that repeats photographs every minute; and this was used by mistake, rather than the motion detection setting, by several teams, resulting in many photos of an empty site.

Citizen science

Our effort soundly confirmed the contribution that trained citizen volunteers can make to wildlife monitoring science. With the return of dedicated volunteers and team leaders from our last remote camera season and an overlap of some volunteers with our winter programs, we are seeing a growing expertise and ability in our volunteer pool. A consistency in volunteers creates great efficiency in our program, leadership for new volunteers in the field, and knowledgeable on-the-ground decisions about camera placement.

VI. Recommendations for Next Year

Looking ahead to the winter 2009-2010 and spring/summer 2010 seasons, we aim to build upon the success of this season and lessons learned to meet our overall program objectives: engaging citizens on wildlife monitoring, through remote cameras and snow tracking recording rare and sensitive wildlife in strategic locations and in core habitat, facilitating exchange of information on wildlife, and informing through data collection wildlife and habitat management.

A high priority for our work in 2010 is to better coordinate and communicate the citizen monitoring efforts we conduct through different partnerships across the state. We will likely always have efforts in multiple locations across the state that are conducted with separate project partners and advisors, but we need to ensure coordination.

Specific recommendations are already under consideration from discussions held during and following this season with volunteers, advisors, and staff:

- Increased pre-season training of volunteers, including mock equipment installation, GPS use, and location and/or species-specific focus break-out groups.
- Discussion groups in winter of 2009-2010 of team leaders and long-time volunteers of the program to share knowledge based on equipment, protocols, and field notes to better inform 2010 program planning.
- Re-directed focus on wolverine detection to winter months with greater snow loads in the Cascades.
- Consideration of bait usage in specific locations for specific species in future seasons. This was done in the Olympics in 2009 and may have applications for

our work elsewhere. This will begin with a wolverine-targeted project in the winter 2009-2010.

- Amendment of the project's Species Priority List to include the Cascades red fox as a Level 1 species in response to increased interest by statewide scientists in this animal's distribution in Washington.
- Incorporation of hair snares at strategic camera set locations, with accompanying protocols.
- Greater geographic diversity of our volunteer pool to better allow for increased flexibility in travel and response time to remote locations.
- Increased understanding and preparedness for monitoring access across the US-Canada border.
- Increase in teams on the British Columbia side of the border, and continued use, if feasible, of entering North Cascades locations via the Canadian side of the border.
- Continued use of the video feature of the Cuddeback camera model, which allowed capture of a still photograph immediately followed by subsequent video footage, helpful in identification.
- Consider distributing Reconyx models in combination with Cuddebacks to the teams closer to roadways and Interstate 90, as we found through testing this season that a change in camera models increased results in the same location. The combination of the Reconyx's ability to take several pictures in quick succession and the Cuddeback's ability to take video will increase efficacy for each camera location.
- Consider increasing work along additional highways with WSDOT to complement their statewide work building off the success of the I-90 project.

We will continue to use discussions with our volunteers, advisory council, and staff, plus analysis of additional results this winter to help guide our plans for future monitoring work.

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