Cascades Citizen Wildlife Monitoring Project

# 2008 Remote Camera Field Season Report



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Images on cover (clockwise): Volunteers installing camera at Price/Noble Creek, volunteers installing camera at Hyas Lake, elk recorded at Manastash Creek, wolf pups recorded in the Methow Valley

Partner Organizations:



# I. Abstract

This report summarizes and discusses data collected from 43 remote cameras placed in Washington's Cascades during the 2008 season as part of the Cascades Citizen Wildlife Monitoring Project. The report also provides an overview of the program's structure and function, and presents recommendations for 2009. This was the first season with a coordinated, large effort by three organizations; marked with new equipment and a sizeable volunteer force. The effort resulted in the capture of thousands of photographic images documenting the presence of a diversity of species along a 15-mile area of Interstate 90 and throughout Washington's Central and North Cascades. Many common species were documented. Uncommon or rare species were also documented, including the first resident wild wolf (*Canis lupus*) pack confirmed in Washington since the 1930s, a lynx (*Lynx canadensis*) in the Pasayten Wilderness, and a Cascades red fox (*Vulpes vulpes cascadensis*) in the Teanaway landscape. The program's calendar and data was affected by record, heavy snowfalls late in the season, which resulted in many of our cameras being placed in the field later than planned, especially in high-elevation locations.

# II. Project Overview

The Cascades Citizen Wildlife Monitoring Project (the monitoring project) is a joint effort between Conservation Northwest, I-90 Wildlife Bridges Coalition (the 2008 fiscal sponsor of the program) and Wilderness Awareness School (WAS) to conduct citizen wildlife monitoring in Washington's Cascade Mountains. Historically, components of this project were carried out through separate efforts of the partner organizations.

Conservation Northwest has placed remote cameras in Washington since 2000 under their Rare Carnivore Remote Camera Project to monitor for the presence of rare and elusive species not only in the Cascades, but also in the Kettle River Range and Selkirk Mountains of northeast Washington. Outside of the monitoring project, Conservation Northwest will continue to collect remote camera data in locations outside of the Cascade mountain range as a separate, and at this point more limited, effort under the Rare Carnivore Remote Camera Project.

For the past two 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 was done to catalyze and complement the larger scientific work needed for the I-90 Snoqualmie Pass East Project.

The Washington Department of Transportation proposes to expand Interstate 90 from four to six lanes for 15-miles from Hyak to Easton just east of Snoqualmie Pass, while taking measures to make the roadways safer for motorists and wildlife. The 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. Citizen monitors have been collecting wildlife presence data at some of the locations where

crossing structures are proposed, using a combination of cameras and snowtracking transects.

In the winter of 2007, the three partner organizations formed the Cascades Citizen Wildlife Monitoring Project with the following program objectives:

1. To engage and educate citizens on wildlife monitoring in the critical habitat areas of Washington's Cascades
2. To record wildlife presence in Washington's Cascades along Interstate 90 in strategic locations and in core habitats through remote cameras and snowtracking
3. To record the presence of rare and sensitive species in the Cascades that conservation efforts aim to recover and the I-90 Project hopes to connect habitats for, including wolverine, gray wolf, and North Cascades grizzly bear
4. To facilitate exchange of information on Cascades species, including data from monitoring efforts, between public agencies, organizations and interested individuals.

Conservation Northwest provides direction and coordination for the placement of remote cameras into core habitats important to the larger or more elusive carnivores in which we are particularly interested. In our planning, core habitats were defined as areas of public lands with large blocks of habitat relatively removed from roadways and other disturbance; often un-roaded, roadless, wilderness, or National Park landscapes. I-90 Wildlife Bridges Coalition provides the direction and coordination for year-round monitoring work in habitat along the I-90 Snoqualmie Pass East Project, which involves the expansion of I-90 and stretches 15 miles from just east of Snoqualmie Pass at Hyak to Easton. Wilderness Awareness School, an environmental education organization, trains and coordinates volunteers to conduct snowtracking surveys along transects from December to March, to document wildlife presence in the vicinity of future wildlife crossing structures planned for the interstate as part of the I-90 Snoqualmie Pass East project. An advisory council, consisting of agency biologists, wildlife experts, and project partner representatives, offers scientific guidance to our program and ensures close coordination with ongoing studies (for a list of members, see Acknowledgements).

The annual cycle of the monitoring 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 November 1st. In November, we shift our main focus to the winter snowtracking program that runs through March. During winter months, strategically deployed remote cameras are managed either by program volunteers or by program partners such as agency scientists who have an ongoing study complemented by 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. Our intended timeline was to have cameras on the ground along I-90 beginning in April and by July or as snowmelt allowed in more remote areas. But due to a heavy snowfall year, many cameras were installed in the field later than planned.

In preparation for the first season of this large, newly-combined program, we spent December 2007 through March 2008 researching and purchasing new equipment and supplies, including lure, GPS units, cameras, and mapping software. We also designed data sheets and a written protocol for consistent data collection and processes, consulted our advisory council on all aspects of the program, and trained volunteers. We recognized that we would continue learning throughout the field season by testing the success of our various equipment, the thoroughness and ease of our protocols, and the preparedness of our volunteers.

## III. Methodology

Remote cameras are used for this program because photographic evidence is a relatively easy, verifiable method of documenting species presence and adding to data on the geographic distribution of species, while achieving our objectives as listed above. In comparison to wildlife surveys, they are 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 2008, part of our process was the recognition of the 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 their target species, and our protocols, including those pertaining to the use of lure, were all developed with and approved by our advisory council prior to the field season.

### Camera Locations and Species Focus

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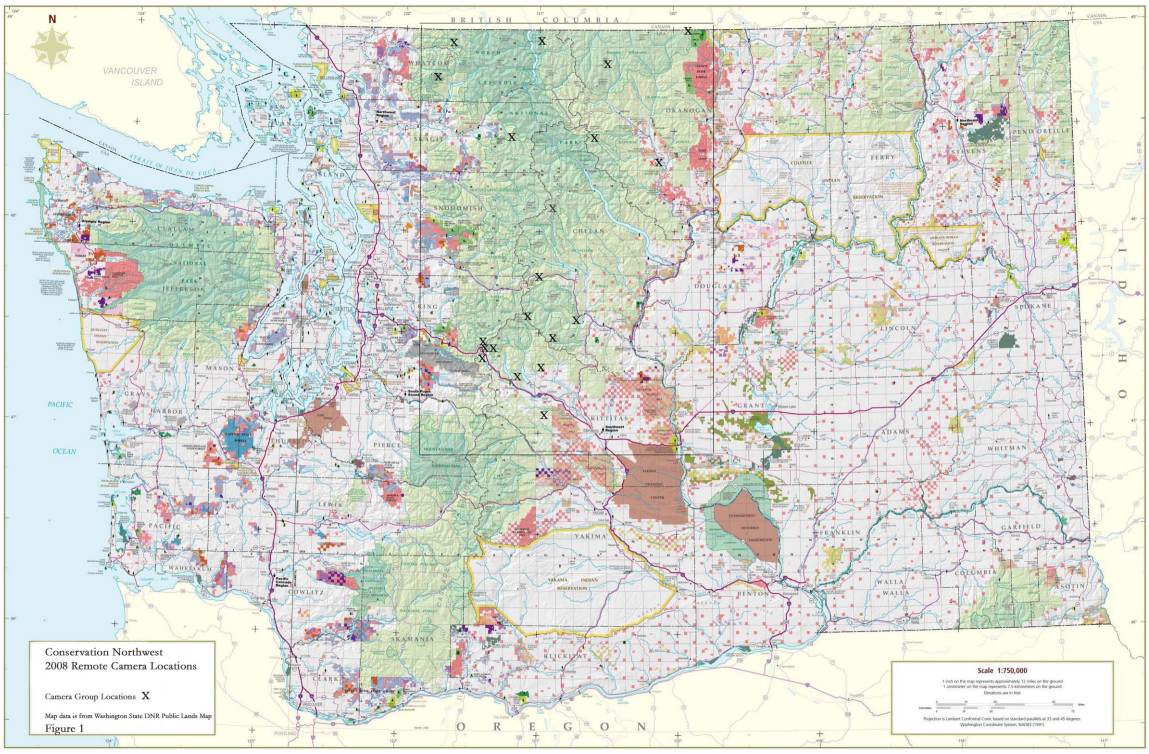
The number of camera locations this year was limited by the availability of equipment and the decision to dedicate multiple cameras to each site where possible. Specific location of the cameras was driven by the program objectives, resulting in 7 cameras along the I-90 Snoqualmie Pass East Project, 28 cameras in core habitats of the Cascades (as defined in the project overview), and 8 cameras deployed in response to reports or opportunities identified once the season was underway (Figure 1 and Appendix A and B).

We conducted a review of past remote camera locations, reports of sightings of target species, and important connectivity measures proposed for the I-90 Snoqualmie Pass East Project; held an advisory council discussion; and conducted informal interviews to generate a pool of potential camera locations. The list of potential camera sites was reduced to our final number of locations based on our estimates of the likelihood for success, feasibility of the locations, and presumed impact of the results. For the

installation of several of the cameras, agency biologists accompanied staff and volunteers to guide their placement in specific habitat or sighting areas within a general location.

Figure 1. Map of Washington State illustrating all camera locations




All seven cameras located along I-90 just east of Snoqualmie Pass shared the objective of documenting species presence in this critical habitat connectivity and wildlife passage area. Cameras were located strategically near proposed crossing structure investments planned as part of the I-90 Snoqualmie Pass East Project. The camera locations complement winter snowtracking transects to supplement that data. The camera locations selected were:

- Two cameras in forested areas at Hyak, south of Interstate 90 at the easternmost portion of the Summit at Snoqualmie ski area where potential ski area expansion activities are being considered.
- Two cameras north of Interstate 90 between Price and Noble Creeks, just east of the proposed Rock Knob overpass.
- Two cameras north of Interstate 90 at Gold Creek, where the proposed underpasses are to be constructed.
- One camera without lure in the forested island between the east and westbound lanes of I-90 just west of Easton, where both an over- and underpass are proposed for construction.

Twenty-eight cameras were placed in the Cascades to target rare species including wolverine (*Gulo gulo*), fisher (*Martes pennanti*), gray wolf (*Canis lupus*), and the North Cascades grizzly bear (*Ursus arctos*). We recognized the value of the other species that

these cameras would record, but selected specific sites and lures for these cameras based on the target species. These camera locations and target species were:

- Crater Moraine, wolverine
- Cyclone Lake, wolverine and grizzly bear
- Hyas Lake, wolverine and fisher
- Iron Gate, gray wolf and grizzly bear
- Manastash, gray wolf
- Napeequa, grizzly bear
- Paysaten, grizzly bear
- Ross Lake, gray wolf and grizzly bear
- Teanaway, grizzly bear
- Twin Lakes, wolverine
- Twisp River, gray wolf

Eight cameras were 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 2009 season. This responder camera sites were:

- Icicle Creek, responding to July 2008 report of a grizzly bear
- Kendall Peak, responding to an April 2008 report of wolverine tracks in the snow
- Lost Lake, experimenting with habitat on the south side of Keechelus Lake to record wildlife presence at the same elevation as Gold Creek but across the highway from our already established cameras
- Methow Valley locations, responding to reports in May 2008 of wolf sightings and sounds by local residents
- Ridley Creek, responding to a July 2008 wolverine sighting on the south side of Mount Baker
- Stevens Pass/Hwy 2, locations at Mill Creek and Grace/Summit Lakes, responding to potential proposals for potential expansion by the ski area

## Equipment

*Cameras*

This year was marked by the expansion of our use of digital equipment to cover all camera locations, replacing the 35mm film cameras used in the past by Conservation Northwest's Rare Carnivore Remote Camera Project. The decision to switch to the sole use of digital equipment was based on the success of digital equipment in the previous citizen science work along I-90, and to increase storage capacity of cameras between checks, reduce equipment malfunctions in the field, decrease time delay of viewing results, decrease costs and waste of film processing, and improve the ease of use of equipment.

The I-90 Wildlife Bridges Coalition had six Moultrie flash cameras, which were also used this season. The Moultrie model, although digital, is a flash camera that can be considered more invasive than other options and more likely to affect the behavior of animals. Fortunately, technological advances have resulted in availability of no-flash cameras, which minimize potential impacts on wildlife, as well as cameras with rapid-fire capabilities.

This year we selected new cameras to test in the field, first comparing competing camera models and interviewing staff of agencies and organizations who use the various cameras. Our findings suggested that lower cost cameras often become obsolete more quickly and have slower "wakeup" times, while higher cost cameras offer not only greater speed but ability for multiple rapid-fire images following an initial trigger.

We selected the Cuddeback No-Flash model as our basic camera based on a balance between price and desired features. One of the main features we valued in this model was its infrared capability. Infrared cameras are preferred by biologists over flash cameras, which can spook animals. The Cuddeback No Flash takes high-resolution color photographs during the day and black and white or grayscale images during non-daylight hours or in darkness. It can also record video clips. Although this camera had a slower wakeup time than more expensive models, we decided that in a lured situation, we could afford a slower wakeup time and considered that and the lower cost of this model (approximately $300 each). In addition to the Cuddebacks, we purchased a Reconyx RC55 (roughly $530), a "RapidFire" camera for use in a special, lure-free location in a forested island the middle of I-90 where, because of the proximity of the roadway, we took extra caution to not influence animal behavior. In this instance, we felt we would need a camera with more rapid response time, because there was no scent to draw animals to the vicinity of the camera and cause them to linger.

During field testing, our single Reconyx yielded better results in terms of image clarity, triggering sensitivity, and in numbers of images captured than did the Cuddeback cameras. Mid-season, when additional camera funding came through for the project, we upgraded to the Reconyx RC60 model, investing in six cameras which were quickly deployed into the field.

Cameras were mounted onto trees using various methods. Cuddebacks were generally mounted using a screw, inserted through a pre-fabricated hole into the body of the camera and fastened into the tree. A bungee cord was sometimes then wrapped around the camera body to attach it more securely to the tree. Reconyx cameras were mounted using bungee cords placed through the handles provided on the sides of this camera model, and their camera angles repositioned as needed by using branches as wedges between the camera and the tree. Security boxes, or locked cameras, were used in two locations.

*Supplemental Equipment and Supplies*

In addition to remote cameras, we researched and selected additional needed equipment and supplies for both the field season and for data storage and analysis, including memory cards and card readers, batteries, mounting materials, moisture controls, GPS

units, maps, mapping software, and lures. We separate discussion of lures into another section due to the complexity of issues raised.

We chose the SanDisk Ultra II CompactFlash 2.0GB memory card as the standard card for use in both the Cuddeback and Reconyx cameras. In at least one instance, another memory card type was purchased and used when we were out of our standard selection and needed cards quickly. The Moultrie cameras utilized a SanDisk 512MB memory card. SanDisk "ImageMate" USB 2.0 Compact Flash card reader/writers were purchased for team leaders so that they could download photos from the memory cards onto their personal computers. This was a backup measure to help ensure that images captured on cameras were checked quickly and a backup copy saved before cards were sent to project headquarters at the Conservation Northwest office.

Non-rechargeable alkaline batteries, mostly Duracell, were used to power the cameras for logistical reasons and due to their lower cost. Due to the size of the program and number and geographic distribution of volunteers involved, we determined that it would be easier than using rechargeable batteries.

Mounting equipment for cameras included bungee cords to mount and/or secure cameras to trees, and longer screws that were purchased to secure the Cuddebacks to the trees, as the screw that came with these cameras barely extended beyond the camera casing and seemed to be too short to fasten the camera securely. We also purchased ZORB-IT moisture control packets for precautionary placement inside the Cuddeback cameras to mitigate for a reported design flaw that makes them prone to water condensation inside the camera casing.

Several new GPS units were purchased: Garmin eTrex H, with high sensitivity chips. We didn't establish or communicate a datum or standard coordinate units at the beginning of the season, but most of our GPS units were pre-set in latitude/longitude, WGS 84, so this datum and these units were used for the majority of camera installations and location markings. In this report, units have been left as recorded in the field and not standardized to reduce errors or any loss of accuracy that could occur in conversion.

Green Trail maps were used to provide camera locations to volunteers, and we purchased National Geographic TOPO! Washington mapping software for easy map preparation in our office in both digital and hard copy format.

*Lures*

Prior to the season, we researched lures that were both general attractants as well as those available to specifically attract our 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), whether a single lure or combination of lures was more effective, and what conclusions we could draw from our own work this season. We interviewed researchers who use lure 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.

For the safety of our volunteers and to favor less invasive monitoring methods, we chose to exclude the use of bait for our program except for the use of canned sardines. Canned sardines were used several times at specifically-chosen sites to supplement scented lure. The sites selected for this use were far from human activity, and holes were punctured into the can before it was nailed to a tree. Following these applications, we discontinued the use of any food bait in our program and operated solely with scented lures. As with lures, bait can be an effective means of drawing an animal into the view of a camera, but we did not want to influence or encourage animal behavior at our locations with a food reward.

We used a variety of lures (See Appendix C for a list 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. As mentioned previously, the unscented location was located in a forested island the middle of the I-90, where we did not want to attract wildlife or provide reason for wildlife to return to the location. Lure use was recorded at each application in the field for our records.

## Logistics

*Volunteer Management*
The field program is run almost entirely by volunteers and is supported in the office by two part-time staff in Seattle. The volunteer monitors include both experienced past participants in remote camera and/or snowtracking programs, and new recruits. An estimated 2,360 volunteer hours were logged during the 2008 spring and summer season including field time, training, and office time compiling data.

All volunteers are led through trainings to engage them in the overall program, and prepare them for their field season. Two volunteer trainings were held this season in Seattle and Bellingham with approximately 60 attendees.

The trainings covered the purpose and history of the project, an overview of the current year's program, technical training on cameras and GPS units, distribution and review of protocols and data sheets for camera checks and documenting of wildlife sign, a presentation on using tracking for effective camera placement, and overall safety. In addition to the protocols and data sheets, volunteers were provided with information packets on the program, equipment and basic wildlife ID. A background guide on the wildlife of the Cascades we aim to record through our project was provided both online and in hard copy, and staff was available to volunteers for additional questions and information.

Volunteers were assigned to teams throughout the field season planning effort, and greater detail on each camera location was provided at the training. Each team was

assigned to a specific camera location that they would manage for the season, allowing them to become familiar with that landscape and their target species. Teams were structured with a team leader or two co-leaders who were responsible for coordinating their teams in installation and regular checks on their camera(s) throughout the season. The leaders serve as the contact point between the team and program staff, while ensuring that team members followed protocols and had the equipment and supplies needed, and that data and equipment was returned to our office in a timely manner. To meet special criteria and desired qualifications, a strong effort was made to recruit team leaders early (See Appendix D for Remote Camera Team Leader Qualifications).

An additional pool of volunteers remained outside of assigned teams to assist with responder cameras as they were deployed throughout the season.

A webpage sharing the results and progress of each team throughout the season, and containing downloadable versions of documents that were given to volunteers during trainings, was provided as a resource. This was complemented by a monthly e-newsletter sent to all volunteers that contained program updates to keep momentum and facilitate information sharing throughout the season.

*Protocol, field procedures and processes*
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 in a well thought-out and efficient way. We reviewed our protocols used during the snowtracking season and prepared protocols for our remote camera work specific to both the Moultrie and Cuddeback camera models. No protocol was written for the Reconyx camera model since initially our program had only the one camera, and more weren't added to the program until later in the season. (See Appendix E for Cuddeback protocol). A data sheet was newly created for remote camera checks, and documents from the snowtracking program for recording wildlife sign and tracks were slightly modified for use when checking cameras. (See Appendix F for remote camera data sheets).

The appendix of our protocol contains a Species Priority List for 2008, a means of grouping wildlife into priority levels based on the significance of a species being recorded by our project. A determination of high significance was based on low populations of a species in the project area and potential overlap with ongoing agency studies. For this season, the list was slightly modified from the list used by our winter snowtracking teams to better reflect the geographic scope of our remote camera work, while attempting to provide consistent data collection and analysis between the snowtracking and camera aspects of the program. The winter snowtracking program is focused entirely along I-90, and therefore has a different expectation of the wildlife likely be recorded.

In our 2008 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, fisher, lynx (*Lynx canadensis)*, gray wolf, grizzly bear, and cougar *(Puma concolor*). Level 2 species included 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.

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 their schedules and field conditions. General guidelines called for cameras to be installed along Interstate 90 in April and into higher elevation or core habitat areas by early July, or as soon as snowmelt or other conditions allowed. Cameras would be checked approximately monthly and removed in October or before snow levels became prohibitive. All team members were required 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.

**Communications**

Two months into our season, an official communications protocol was established and distributed to provide clarity on the process by which images from our cameras were shared both internally and externally. (See Appendix G for communications protocol).

Communications for our program had three main audiences: program volunteers, our advisory council, and the public.

As mentioned previously, a website and monthly email newsletter were set up to keep volunteers engaged throughout the season and aware of their part of a larger program.

The advisory council met by phone conference twice a year, but received email updates on the program each month. Special emails and phone calls were made to the council during the season when a Level 1 species was confirmed at a site to share those results and to discuss any potential media work that we may engage in. Individual members of the council were also consulted throughout the season to review images, share feedback from our field volunteers, and to request advice on responder camera locations. The council also communicated needs for additional responder cameras to our program as their agencies received reports from the public.

Press-related communications were handled through program staff and agencies affiliated with advisory council members, following our communications protocol.

# IV. Results

Sixteen identifiable mammal species were captured in the thousands of images taken at our camera sites, not including additional photographs of domestic animals, rabbits, and people. Cameras also recorded images of rodents and birds that we do not tally or analyze in this report, other than the northern flying squirrel (*Glaucomys sabrinus*), tallied in our numbers, and raptors, which we only list in the Appendix. Three Level 1 (highest priority) species were recorded: a lynx in the Pasayten Wilderness, gray wolves in the Methow Valley and a drainage of the Twisp River, and cougars at our Hyak, Manastash, Teanaway, Icicle Creek, Twisp River, Ross Lake and Iron Gate cameras. We did not record wolverine, fisher, or grizzly bear at any of our camera locations. All of the Level 2 and Level 3 species were recorded at at least one of our camera locations.

The camera locations in total can be viewed by geographies defined by major barriers to wildlife in the Cascades: south of I-90, I-90 north to Highway 2, and north of Highway 2. Lynx and gray wolves were only recorded north of Highway 2, while the only documentation of a Cascades red fox and a mountain goat was in the area south of Highway 2 but north of I-90. Cougars, elk, deer, and black bears were present across all geographic ranges.

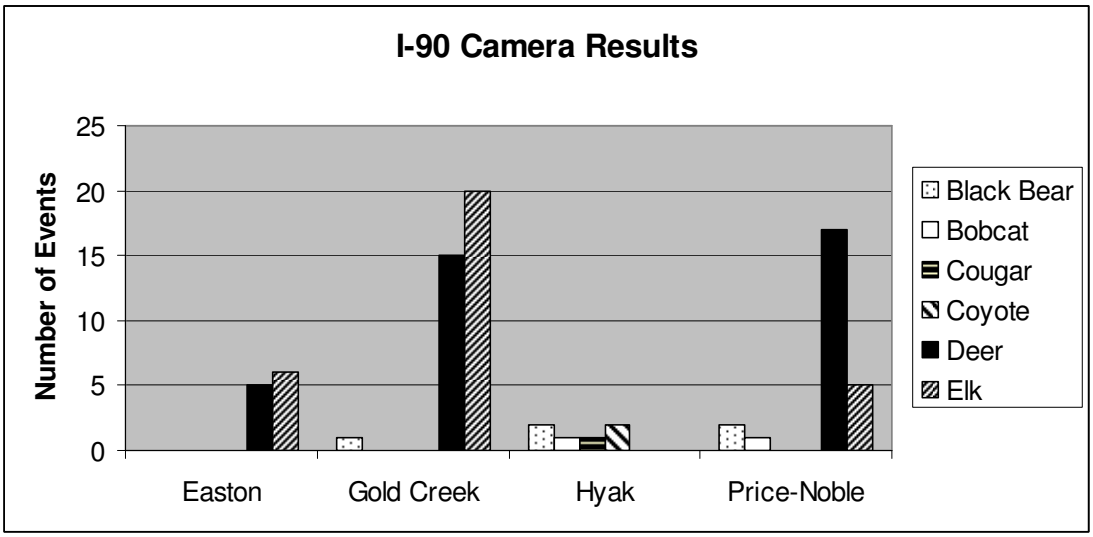
Black bears were not only common throughout the geographic range of our cameras, but exhibited a wide diversity in physical appearance; in coat color, size, and face and ear shapes. See Photo Appendix H, which contains a selection of images from all of our camera locations, including a diversity of black bears. We also recorded a few collared and/or tagged animals including a black bear at Stevens Pass, and collared cougars at Teanaway and Manastash.

Our cameras, especially the RapidFire$^{TM}$ Reconyx, often trigged multiple images of the same animal or group of animals, so we divided these series of photographs into "events" to get a more accurate picture of the number of visits to each camera location and to make the data more meaningful. An event is defined as an image or group of images within a short time frame (an hour apart) that we can reasonably assume is the same animal or group of animals. We considered images to be part of the same event if there was less than an hour between images and it appeared to be the same animal(s). Events are then reported by their camera location group as defined in the Methodology portion of the report: I-90, Core Habitat, and Responder.

*Interstate 90 Cameras*

Across our seven cameras at four locations six mammal species were recorded, one of which was a Level 1 species - a cougar at Hyak. (Figure 2 and Appendices B and H). Deer and elk were the most commonly recorded species. They were the only two species recorded at Easton, while no ungulates were recorded at Hyak. Price-Noble Creeks and Hyak had the highest diversity in terms of the number of species recorded. Price-Noble and Gold Creeks were the sites with the highest number of camera events over the season.

Figure 2. Interstate 90 Camera Data

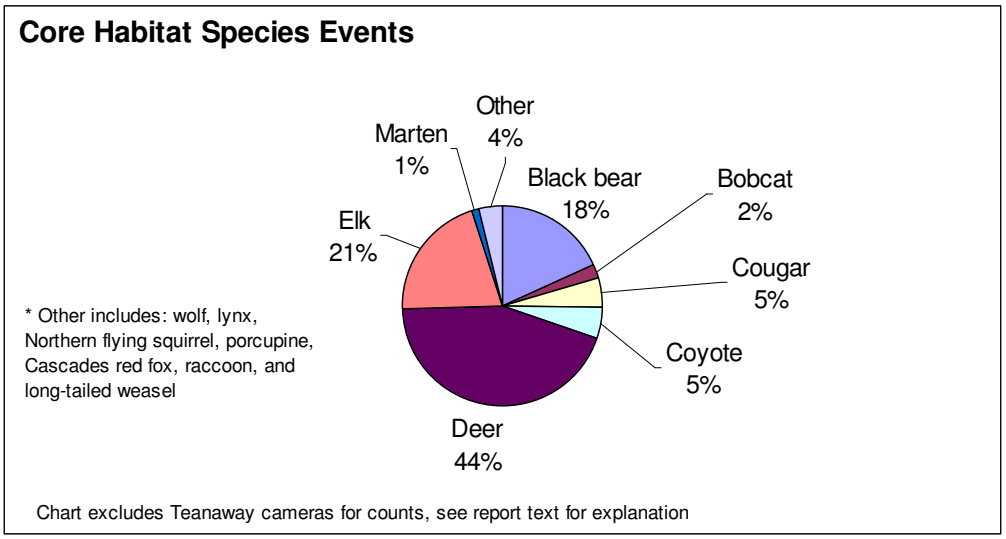



*Core Habitat Cameras*

Across our 28 cameras at 11 locations, we recorded a total of 14 species, three of which were Level 1 species: a wolf at Twisp River, a lynx in the Pasayten Wilderness, and cougars at Manastash, Teanaway, Twisp River, Ross Lake and Iron Gate. The lynx recorded in the Paysaten wilderness was un-collared, while collared cougars were recorded at Manastash and Teanaway.

Deer were the most commonly recorded species across our 28 Core Habitat camera locations, followed by elk and black bear (Figure 3 and Appendix B). Of note is that for the Teanaway landscape, where we had eight cameras recording data and events were too numerous to calculate by the release of this report, each species was counted as one event if the species was not already reported from another location.

Figure 3. Core Habitat Camera Results




Of the Core Habitat cameras, 71% were located east of the Cascade Crest and the other 29 % west of the crest. When results are broken into eastern (Figure 4) and western (Figure 5) locations, deer and black bear are among the most commonly recorded across all sites. No elk were recorded on western cameras, while they were the second most common species on eastern cameras. While deer, elk and black bear comprised 82% of all events at the eastern cameras, the eastern cameras recorded a greater diversity of species overall, including two Level 1 species that western core habitat cameras did not record – lynx and wolf, as well as a rare Cascades red fox. Black bear and deer comprised 88% of all events at western cameras.

Figure 4. Eastern Core Habitat Camera Results

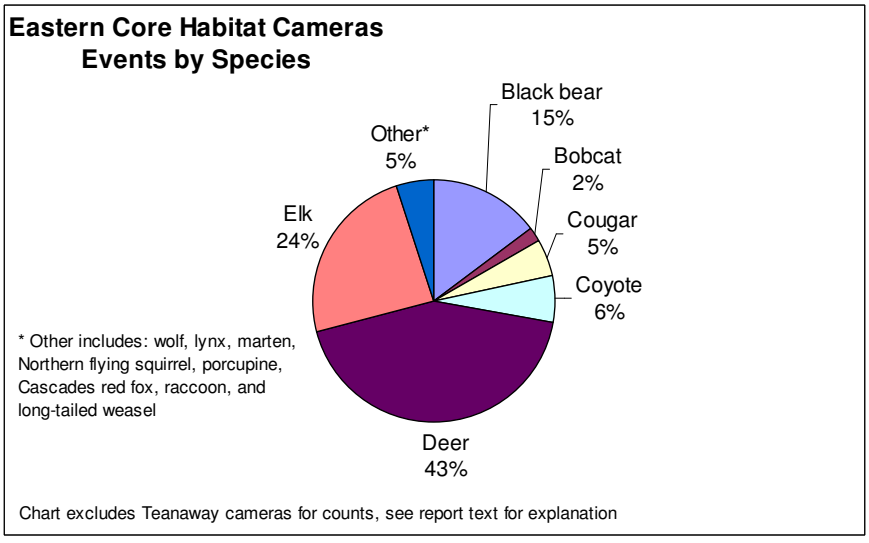
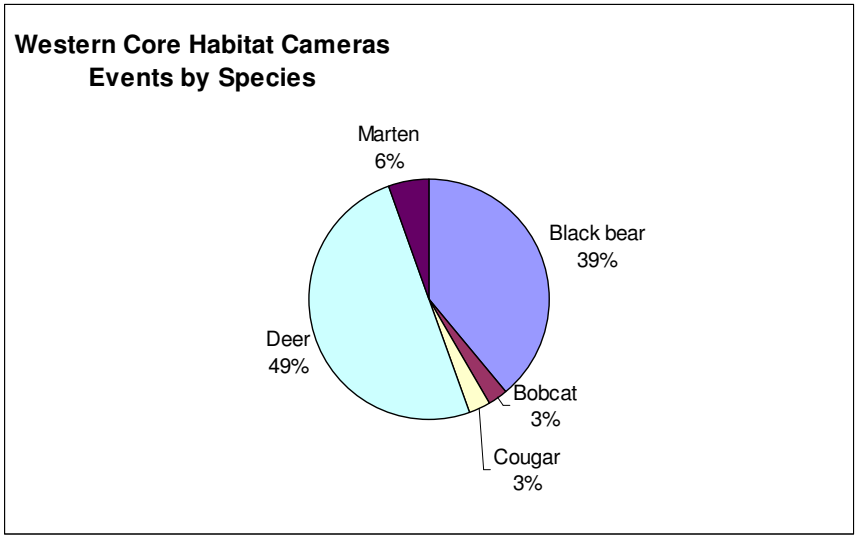


Figure 5. Western Core Habitat Camera Results




*Responder Cameras*

Across our eight Responder cameras at six locations, nine species were recorded. Two of our Level 1 species were recorded – gray wolves at our Methow Valley location and a cougar at our Icicle Creek location (Appendix B).

Of our four responder camera locations, where cameras were quickly deployed to follow up on potential sightings of critical species, only the Methow Valley cameras were successful in documenting the target species – gray wolf. On May 25, 2008, the large canid that we believed to be an adult wolf was recorded in black and white. The first image that included wolf pups was recorded on July 17th. Two wolf pups were recorded in that first image, followed by an image including six pups the following day. Images and video of single and multiple pups continue through July 29th, and then only a single pup is photographed through August. On July 28th at 3:05 am, there is a series of photographs of an adult wolf without a collar approaching and taking away a leg bone with hooves at the site. In the approximate six months that the Methow Valley responder cameras were in place, images were captured of gray wolf pups, juveniles, and adults. These cameras not only recorded hundreds of images of wolves (Photo Appendix H), but a wide diversity of other species, including black bears with and without cubs, deer, coyotes, bobcats, skunk (*Mephitis mephitis*), golden eagle (*Aquila chrysaetos*), an unidentified owl, turkey (*Meleagris gallopavo*), and magpies (*Pica pica*) (Appendix B). Data is still being compiled from this location due to the large volume of images.

While they did not record the target species they were deployed for, the other responder cameras did record wildlife presence at their locations. The Icicle Creek camera recorded mostly black bear and coyote. The Kendall Peak camera captured the only image of a mountain goat recorded on our cameras this year (Photo Appendix H), and the Ridley Creek camera documented a black bear.

Of the two responder camera locations that were responding to potential new opportunities for using citizen monitoring, a total of three species were recorded – deer,

elk, and black bear (Appendix B). On one of the two cameras located at Stevens Pass in areas where the ski area proposes to expand, multiple images of a tagged black bear were recorded (Photo Appendix H). The Lost Lake camera, deployed to explore wildlife presence in habitat on the opposite side of I-90 from our Gold Creek cameras, captured deer and elk.

# V. Discussion

The results of the field season contributed to the knowledge base of species location and presence in Washington's Cascades, and provided an example of the contribution that citizen science can make to inform public land management and conservation.

*Data Analysis*

In analyzing the results of our season, it is important to note that inferences about either species abundance at a specific site or absence from that site cannot be drawn entirely from our data. The report data does not differentiate between the visit by an individual animal multiple times to one site and the visit of multiple individuals of the same species to a site. Though it is potentially possible to revisit the images captured at a specific camera to make this determination if an individual's marking, tagging, or features are unique, we did not feel it was possible to do this while maintaining a confident level of accuracy across all of our sites. Since there are a wide variety of reasons an individual within the landscape might not have visited a particular camera, species absence cannot be inferred from our data. As stated previously in this report, the data produced by our program can simply document species presence and complement outside scientific studies attempting to reach greater conclusions.

Additionally, there is a certain error inherent in the calculations of our numbers in this report due to the sheer volume of images that were downloaded, reviewed and transferred between different mediums - memory cards, CDs and computers. There were also a number of unidentifiable species at camera locations: either the images were too blurry or too few identifying characteristics of an animal were visible to distinguish between species. Such images were classified as specifically as possible (e.g., "unidentified feline" or just "unidentified") and stored in our database, but they were not tallied for the purposes of this report. We also had a few cameras that were stolen and data was lost.

Along I-90, all six species recorded were expected and our data confirmed past years' results from both remote cameras and winter snowtracking. The two sites along I-90 that measured the highest total number of events were Gold Creek and Price-Noble Creeks, which is consistent with our data from the 2007-2008 winter snowtracking report. While deer and elk were the species recorded by our I-90 cameras with the most frequency, the 2006-2007 winter snowtracking report reports bobcat and coyote as the species most frequently detected during snowtracking, with the two species comprising 75% of all reliable detections. This difference is likely due to seasonal movements of deer and elk to lower elevations during winter months. We were surprised by the absence of marten in our results this year at the Hyak location, since this species was confirmed during the past two seasons of both remote camera and snowtracking work in the Hyak corridor. In past

years, marten was recorded at this location in winter and into early spring, while snow remained on the ground. The lack of documentation of marten this year may be the result of delayed deployment of cameras into the area because of deep snow packs late in the season.

Among all cameras deployed this year and wildlife documented, the most significant result was the presence of gray wolves recorded on our responder cameras in the Methow Valley and on one of our Twisp River core habitat cameras. The pups in the July 2008 results were significant, as they confirmed a resident pack in Washington's Cascades, leading to greater scientific and management direction from government agencies. Our data can be analyzed in complement with data provided by the Washington Department of Fish and Wildlife's genetic and telemetry studies. In August, as the telemetry data reported that the collared wolves had moved into higher elevations than where our cameras had recorded them during previous months, an un-collared pup continued to visit our unscented camera location until August 30th. We cannot draw a conclusion from our data, but found the presence of a lone pup for that length of time significant enough to highlight here. Video and still photo image from our cameras in July allow us to observe the pups feeding on agency-provided bait, and exhibiting behavior such as rolling and interacting with their environment. Our records of collared and un-collared wolves throughout the season contribute to the agency's understanding of the wolves' appearance and movements.

Other species recorded on our core habitat and responder cameras were consistent with expectations of species presence and known locations in the Cascades. Lack of documentation of wolverine, fisher, and grizzly bear were disappointing, but not a big surprise due to the small size of their population in our project's vicinity.

Points to consider in evaluating our results and potential contributing reasons for the lack of documentation of these species may include: the shorter timeframe that our cameras were active this season due to deep snow conditions late in the season; difficulties in camera maintenance for those that were installed above snowpack; the high recreational traffic of human and domestic animals in close proximity to some of our locations; and changes in animal usage of a location throughout the seasons. We have now started collecting feedback on levels of wildlife use and site conditions from our volunteer teams to help improve our site selection in future seasons.

The fact that a greater diversity of species was recorded on our cameras located east of the Cascade Crest could be due to the larger proportion of cameras installed on the eastside. If more westside cameras are placed in the future, it will be interesting to compare the data with this year's results to determine whether an increase in cameras leads to an increase in the number of species documented.

*Efficacy of Citizen Science*

The documentation of the species that are reported in our results and the production of this report to share those results in a concise manner demonstrate that citizen science can be an effective means of providing information to land managers, scientists, and

conservationists. In addition to the documentation of a pack of gray wolves in the Washington Cascades this season, our program was able to document an un-collared lynx in the Pasayten Wilderness that provides supplemental information to those working towards understanding and recovering that species in Washington State. The key to the success of our project's scientific value is dependent upon two things: first, a strong coordination with the public agencies and scientists; and, second, an overall well-planned and supported project.

Citizen science is an effective means of outreach to the public on wildlife issues in the Cascades. Our program engaged and educated more than fifty volunteers in wildlife monitoring this season, ranging in age from teenagers to retirees. The enthusiasm, increased knowledge, and dedication of this volunteer pool are indications of the success of the project. The value of public involvement is incalculable. As citizens become engaged in these issues and share their experiences with others in their community, momentum is built. Awareness and greater funding for conservation can be supplemental consequences.

There are limitations to using a citizen volunteer force for gathering scientific or biological information. Varying levels of skills and experience can affect data integrity, particularly with snowtracking, which includes often subjective documenting of wildlife sign and site conditions. To minimize effects of this limitation we use our advisory council to give guidance; provide consistent trainings; and develop clear protocols, data sheets, and informational backgrounders for our volunteers. Additional limitations involve lack of consistency in camera installation within a season and from one season to the next (e.g., angle, proximity to game trails, proximity to lure), and time constraints of a volunteer force, which can lead to lower schedule flexibility and camera check frequency. These are limitations that we accept and that we factor into project planning.

*Reflections on Methodology*

Switching from 35mm to a digital format was a good choice for the project. Digital cameras are easier to use and maintain, images are of higher quality than those produced by the 35mm cameras, and the images are much easier and less expensive to process (very important given the high total number of images collected). The field season allowed us to discover the benefits and flaws of each of the models that we tested.

Laser beam technology made the Moultrie model much easier to correctly aim during setup than the Cuddeback and Reconyx models, which seemed to have inferior aiming mechanisms. The Moultrie and Reconyx models, which provided handles for securing the cameras to trees with bungee cords and/or ropes, were both simpler to mount and allowed more flexibility in adjustment of the camera angle than the Cuddeback model, which has a design favoring mounting with a screw through the camera's shell. The Moultrie and Reconyx models were reported as the favored cameras in terms of ease of operation in the field due to factors including easier hardware set-up as discussed above, and greater simplicity in the buttons and functions, which were easier to understand. All camera models we used are battery operated (6-volt for Moultrie and D's and C's for Cuddeback

and Reconyx). The requirement of batteries, rather than a consistent power source such as solar energy, limits the operational life of cameras in the field between checks.

The Cuddeback model had a delay between triggers, often resulting in the capture of only one image of an animal per visit. This setting could be changed by using the video option in place of the still image option on the camera. The Reconyx, with rapid-fire capabilities, took images in immediate succession as it was triggered. This resulted in multiple images per visit, providing greater likelihood of species identification in analysis. With the Reconyx, the video setting was not needed to avoid a delay. The quality of images varied by model and site conditions. The Cuddeback model took lower quality photos, in terms of resolution and color, during dawn and dusk periods, and switched to black and white in darkness. All models in pre-season or seasonal use could produce blurry images of wildlife for a variety of reasons that included motion, moisture on the outside of or beneath the lens, and quality and amount of light. The quality and number of photos are important to the success of our program, specifically in meeting our objective of recording the presence of rare and sensitive species. Species are best identified with clear photos and a series of shots from several angles of view.

Only a few of our cameras were installed this season with security boxes to protect them, and none of the cameras were labeled to reflect their ownership or purpose of use. Two cameras located in the Napeequa, one near Hyas Lake, and one camera in the Teanaway were reported missing and are presumed to have been stolen. Beyond the immediate cost of equipment, there was the unfortunate loss of image data from these cameras as well.

## VI. Recommendations for Next Year

Looking ahead to the 2009 season, we aim to build upon the success of this season to meet our program objectives.

When establishing next year's core habitat camera locations, for example those targeting the North Cascades grizzly bear, we plan to better use available information on seasonal habitats and feasibility of our volunteers' access to guide camera placements. From what we learned this year, we'll also want to avoid domestic animal and human traffic as much as possible when considering camera placements. We may want to go to greater distances to place cameras in unpopulated areas and away from hunting or other trails, both to improve our results targeted at sensitive and rare species and to avoid loss of cameras by theft. Additional core habitat camera considerations include moving our cameras throughout the season as animal movements and habitats change based on food sources and other factors, and potential transboundary location planning; looking into habitat in the Cascades on the Canadian side of the border.

The cameras along I-90 will increase in consistency next year with the annual transects utilized by the winter snowtracking program, and explore locations slightly farther from the roadway within the Connectivity Emphasis Areas of the I-90 Snoqualmie Pass East Project. Continued exploration of monitoring on both the south and north side of the interstate in connectivity areas will occur.

Due to difficulty in maintenance and access during fluctuating snow levels, we recommend strategic and thoughtful use of any cameras employed from winter through early summer snow months.

For our purposes, the Reconyx cameras are superior in terms of ease of use and results, and as the budget allows we favor this model as the extra cost is worth it to achieve the objectives of our program. Further testing on alternative battery types and power sources, including rechargeable batteries and solar chargers, should be conducted to better meet program needs. Research on effective security measures for cameras in the field will be conducted and current practices in some locations, such as use of flagging, will be analyzed.

All protocols will be reviewed in winter of 2008 and 2009 for improvement in project clarity and direction. Improvements and edits will include setting standard camera settings for various situations, establishing a standard datum and units for recording GPS coordinates, and providing further details about use of batteries and other supplemental equipment. The Priority Levels (1 through 3) for our project's species of interest should be revisited prior to spring of 2009 for potential adjustments based on the scope of the program and any updated information on species presence. We will also develop a protocol specific to the use of Reconyx cameras by modifying existing protocols. Development of a lure field protocol and continued information gathering on lures will be conducted this winter with a strong focus on selecting most effective, species-specific attractants.

Improved volunteer training on all of the above protocols, and greater clarity in team structure and responsibilities will improve data flow, integrity and control. Suggestions for consideration include early recruitment and special training for volunteer team leaders, retention of an office intern to provide greater central support, and improved volunteer communications.

All of these recommendations will be vetted internally and with our advisory council prior to the next season.

## VII. Acknowledgements

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