Citizen Wildlife Monitoring Project 2011 Spring-Fall Field Season Report



February 2012

Prepared by:

Kit McGurn, Volunteer Coordinator Conservation Northwest

Jen Watkins, Project Director Conservation Northwest and I-90 Wildlife Bridges Coalition

Ben Silver, Project Intern

Seattle, Washington

With contributions from Erin Moore, Conservation Northwest (Editor)

Images on cover: View of the Teanaway through the antlers of an elk that visited our field camera.

Full report and appendices available online at http://www.conservationnw.org/northcascades/cascades-citizen-wildlife-monitoring

Cascades Citizen Wildlife Monitoring Project partner organizations: Conservation Northwest, I-90 Wildlife Bridges Coalition, and Wilderness Awareness School



Table of Contents

I.	Executive Summary	4
II.	Project Overview	5
III.	Methodology	8
IV.	Results and Discussion	16
V. 1	Recommendations for Next Year	22
VII.	Acknowledgements	23

APPENDICES

- Appendix A CWMP Photos
- Appendix B CWMP Sample remote camera data sheet
- Appendix C CWMP Sample monitoring protocol
- Appendix D Species Priority List

I. Executive Summary

From March through November 2011, Conservation Northwest's Citizen Wildlife Monitoring Project documented wildlife at a total of 23 sites in the Olympic National Forest and Okanogan-Wenatchee National Forest. During the monitoring season we captured thousands of photos of wild animals, from rare carnivores like wolves to deer and elk and more. All told in 2011, the monitoring project—a joint effort between Conservation Northwest, I-90 Wildlife Bridges Coalition, and Wilderness Awareness School—marshaled 54 volunteers and more than 2,160 volunteer hours.

This year, in the Olympics, three teams of citizen volunteers placed five remote cameras in three locations, in habitat on Mount Ellinor, Mount Rose, and Mount Washington. The objective was to document pine marten in densely grown, high elevation forests selected by Olympic National Forest staff. Wildlife visited our cameras nine times, their motions triggering recorded images of black bear, bobcat, coyote, deer, and mountain goat. We did not record photos of our target species, pine marten, at any of the stations.

In the Cascades, 14 volunteer teams placed 34 remote cameras in 20 locations resulting in thousands of images of wildlife. We focused the Cascades monitoring on two areas: 1) habitat near Interstate 90 (I-90) east of Snoqualmie Pass, an important wildlife movement corridor, and 2) habitat running north—south from Interstate 90 ranging from the Paysaten River drainage in Manning Park in British Columbia to the Manastash area south of Ellensburg, where sightings or habitat quality suggest the potential presence of a grey wolf or grizzly bear. The results of the field season expanded what we know about the location, presence, and movement of wildlife in Washington's Cascades. It drew a lively image of these iconic landscapes by recording the presence of black bear, bobcat, cougar, coyote, deer, elk, grey wolf, lynx, and moose.

In the Okanogan, an additional pilot site was set up this year in coordination with Washington Department of Transportation to monitor wildlife presence in high roadkill and key habitat connectivity areas along Highway 97 north of Riverside. Here in the Okanogan Valley, one team deployed two cameras.

Highlights of the 2011 monitoring season in the Cascades included:

- Photographs of a grey wolf in the Teanaway, helping to document and confirm the most recent wolf pack returning naturally to Washington's Cascades;
- A series of videos of four cougars together, rubbing the tree and spending time in front of our camera at Ingalls Creek;
- Three lynx visiting our station together in the East Pasayten in British Columbia's Manning Provincial Park;
- Two coyotes walking by our unscented camera station in a forested island between the east and west bound lanes of Interstate 90 near Easton, where a wildlife crossing structure (part of the I-90 Snoqualmie Pass East Project) is proposed to facilitate safer passage.

With the help of our camera results, biologists were able to better monitor the potential territory of the remaining members of the Lookout pack as well as the range of the new Teanaway wolf pack.

Our monitoring results also helped confirm that the forests at Snoqualmie Pass that I-90 bisects are important habitat, well visited by wildlife. 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 in the I-90 corridor complements the larger scientific work initiated by the Washington Department of Transportation for the I-90 Snoqualmie Pass East Project. The highway project spans 15 miles just east of Snoqualmie Pass from Hyak to Easton and includes measures to make the roadway safer for passage of motorists and wildlife. Our monitoring work coincided with the ongoing construction of wildlife crossings at Gold Creek for I-90 as part of the I-90 Snoqualmie Pass East Project.

The methodology and full results of monitoring comprise a majority of the content of this report, with discussion and recommendations for future monitoring seasons.

The work of the Citizen Wildlife Monitoring Project in the Olympic National Forest and Cascades illustrates the priceless contribution that volunteers contribute through citizen science to the management and conservation of Washington's public lands and wildlife. This season's work builds upon previous years' data collection by this program.

II. Project Overview

Conservation Northwest originated our program to monitor wildlife a decade ago, originally as a way to monitor rare carnivores and lend helping hands to wildlife agencies. Since then, we have used citizen science through remote cameras as a means of fulfilling our mission to protect and connect the wildlife and wildlands from the Washington Coast to the BC Rockies. Based on our conservation priorities, we set objectives for our citizen monitoring efforts at the beginning of each year.

Our 2011 wildlife monitoring goals included:

- Contributing time and energy to the Forest Service on the Olympic National Forest to detect the presence of pine marten, as this species has not been documented in the Olympics in over a decade
- Detecting the presence of rare species in the Cascades with the strongest emphasis on gray wolves, with several teams dedicated to helping document the rare North Cascades grizzly bear
- Recording presence of wildlife in key connectivity areas along the I-90 Snoqualmie Pass East Project
- Piloting an effort with Washington Department of Transportation to record wildlife presence within the right of way of Highway 97 north of Riverside, where a high number of accidents between vehicles and wildlife, such as mule deer, occur

Following these priorities for 2011, we initiated efforts in collaboration with agency biologists in the Olympic National Forests to focus on pine martens, and worked within the existing Cascades Citizen Wildlife Monitoring Project (CCWMP) to meet our objectives in

the Cascades. The structure, specific objectives, methodology, and results of this work are discussed in this report.

Cascades CWMP organizational description, objectives, and strategy

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 including 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

During the 2011 field season, cameras were placed according to three distinct strategies:

1. Species specific monitoring in the Cascades—Placement of cameras in remote core habitat areas in the central and north Cascade Mountains in an effort to document elusive predators

2. I-90 wildlife monitoring—Placement of cameras along Interstate 90 east of Snoqualmie Pass in an effort to understand the impact of the interstate highway on wildlife and connectivity and to support efforts to provide safe passage for wildlife and people.

3. Pilot effort in the Okanogan—Deployment of two cameras to help the Washington Department of Transportation monitor wildlife presence in key locations, including high roadkill zones, along Highway 97 near Riverside.

Further discussion on results, lessons learned, and recommendations for next year are included in this report.

Species specific cameras

This year, cameras were deployed in habitat specifically selected for grey wolf or grizzly bear. Cameras were deployed in areas where credible sightings or information indicated the potential presence of wolves and grizzly bears, or where habitat availability for these species was abundant. A majority of our species specific cameras in the Cascades were dedicated to documenting grey wolves as they recover in Washington, while two teams were aimed at detecting North Cascades grizzly bears.

I-90 cameras

For the past four years, the I-90 Wildlife Bridges Coalition and Wilderness Awareness School have coordinated citizen monitoring efforts in habitat just east of Snoqualmie Pass and north and south of Interstate 90 along the I-90 Snoqualmie Pass East Project.

The 15-mile long highway expansion project includes measures to make the roadway safer for motorists and wildlife. In 14 connectivity emphasis areas, 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, using a combination of cameras and snow tracking transects, have collected wildlife presence data at some of the locations where crossing structures are proposed. During the camera monitoring season this year, the Washington State Department of Transportation was already partway through construction of the first 5miles of the project area including the Gold Creek underpass.

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. They also play a lead role in training and guiding volunteers in the field for snow tracking in the winter. The goal of the snow tracking 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 widening project. Please note that the results of the snow tracking surveys are not within the scope of this report. Learn more and view past reports at http://www.conservationnw.org/northcascades/cascadescitizen-wildlife-monitoring

Project advisory council

The advisory council for our project consists of agency biologists, wildlife experts, and project partner representatives. These advisors contribute time to offer scientific guidance to our program and ensure close coordination with other scientific studies ongoing in our project area. We bring the advisory council together by phone twice a year to provide collective feedback on our efforts and guide the upcoming season, relying on individual contacts by phone when schedules prevent a group call. As needed during the year, we also use email and one-on-one contact with our advisors. In 2011, 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, WA Department of Transportation, and Western Transportation Institute.

Field work and report timing

The annual cycle of monitoring runs from March to March. In March of each year, we launch the remote camera program with trainings and initial early spring deployment of cameras that remain in the field until early October. In November, we shift our main focus to the winter snow tracking program, with an initial training and field season that runs through March. During winter months, we also strategically deploy a limited number of remote cameras with a specific species focus. We also lend cameras on request to ongoing

professional scientific monitoring projects in the Cascades to make the greatest use of our equipment. A report generated in spring shares the results of our winter snow tracking and camera program. A report generated in winter shares the results of our spring/summer remote camera program. Previous monitoring reports for all seasons can be found at http://www.conservationnw.org/northcascades/cascades-citizen-wildlife-monitoring/

This season, installation of cameras was based on conditions on the ground and done in coordination with other ongoing monitoring efforts.

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 geographic distribution data of species, while achieving our objectives as listed above. In comparison to extensive wildlife surveys, motion-sensitive cameras are a low-cost way for a volunteer workforce, without intensive biological survey training, to engage in wildlife monitoring and contribute to scientific knowledge and conservation efforts.

While there are many contributions our program makes to knowledge about native wildlife in Washington, it is important to recognize the limitations of our program. For example, we can document species presence in an area, but we cannot demonstrate species absence. Additionally, our cameras are not distributed geographically 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. The installation dates and duration of a camera station vary between sites, so comparison between sites of species presence and abundance is interesting but not a scientific statement beyond indicating species presence at a specific geography.

Camera locations and focus

The number of camera locations this year was determined by resources in our inventory, as the list of locations was much longer than our capacity, of cameras and volunteer teams, to meet. We lent six cameras to ongoing grizzly bear monitoring efforts in British Columbia then used our remaining inventory to dedicate two cameras to each predetermined location. We also kept on hand at least two cameras available in our office for rapid response and field deployment to wildlife sightings reported during the season.

In the fall of our 2010 program, a volunteer team leader submitted a series of photographs from the Teanaway of an unidentified canid with wolf-like characteristics. Upon sharing these results with our Advisory Council, a coordinated monitoring effort between our program, US Forest Service, Western Transportation Institute, and Washington Department of Fish and Wildlife was initiated. Photos in the winter of 2010-2011 confirmed the presence of wolves in the Teanaway. Subsequent research throughout 2011 confirmed a residing wolf pack in the Teanaway, Washington's fourth (there are now five). Of note, our citizen project's cameras were also first to record the Lookout pack north of the Teanaway in Washington's Methow Valley.

Building upon the success of past seasons with this species, we determined that gray wolves would remain a strong focus of our field season, both in teams into confirmed pack ranges and high quality habitats with known sightings. We also planned to continue our work along I-90, pilot an effort with WSDOT on Highway 97, and continue the search to document grizzly bears in the North Cascades and pine martens in the Olympics. In winter and early spring 2012, we hoped to target presence of wolverines.

Before reaching a final decision on our priorities of focus for the spring-fall 2011 season, we consulted with our advisory council to gain their feedback on our focus, dedication of resources, coordination with other ongoing efforts, and locations.

Prior to the launch of our spring-fall 2011 season, we worked with our advisory council to develop complimentary monitoring efforts to ongoing professional monitoring of the two Cascades packs. In the Methow Valley, several teams placed remote cameras to determine the potential extent and movement of the remaining Lookout Pack members. In the Teanaway, we dedicated two teams to documenting the potential range of Teanaway pack members in the larger Teanaway landscape. We also placed several teams directly in the pack's known territory with the goal of documenting pack size and characteristics. In addition to documenting already known wolf packs, we placed camera teams in habitat where either credible sightings have been reported in the past or in habitats connected to known packs where habitat availability and conditions are good for wolves. This habitat ranges from Chelan County (located in between the two documented Cascades packs) to the Manastash area just south of I-90 near Ellensburg.

We also dedicated one team on each side of the British Columbia–Washington border to continue our efforts to document a grizzly bear in the North Cascades. Through our Advisory Council, we knew a larger professional monitoring effort was underway in Washington's Cascades as follow-up to the June 2011 announcement that a photograph was taken of a grizzly bear in October 2010 in North Cascades National Park. Therefore, we dedicated just one team on the US side of the border. This team was posted to the eastern flanks of the Paysaten Wilderness where good bear habitat remains and where a credible sighting was reported over a decade ago. We also maintained one team on the British Columbia side of the border in Manning Park along the Paysaten River.

Along I-90, we maintained cameras at the key connectivity locations where wildlife crossing structures are proposed through the I-90 Snoqualmie Pass East Project. Because the Gold Creek underpass would be under construction during our season and likely scare away some wildlife, the cameras were located over 2 miles from the interstate within the Gold Creek valley. We experimented with several new sites on both sides of I-90 in the Gold Creek corridor during the season and forego monitoring our usual Hyak station.

In the Olympics, we began an effort last year in coordination with the Olympic National Forest and Washington Department of Fish and Wildlife to detect the presence of pine marten. This species has not been recorded on the peninsula in over a decade, although the current habitat is highly suitable for the species. We reviewed past research efforts, and followed clear protocol and direction from our advisors about potential habitat. Finally, we piloted an effort with WSDOT to use unscented camera stations to detect animals approaching or initiating a cross of Highway 97 near Riverside in Okanogan County. This is an area of high mortality for wildlife from animal-vehicle collisions. It is also a key location for maintaining east-west connectivity for wildlife. We experimented with installing and maintaining cameras pointing parallel to the roadway in two locations.

Cameras remained in the field for widely different durations of time, recorded in the tables below.

Cascades species specific habitat cameras

A total of 23 cameras covering 14 locations were allocated to core habitat areas.

Some core habitat cameras were placed in the field for the full season, from March to October (approximately eight months). Other core habitat cameras were placed in the field for shorter durations throughout the season, and moved between locations as our objectives or field conditions changed. For example, two of our teams dedicated to the Teanaway area to assist in understanding the range of the newly confirmed Teanaway wolf pack switched mid-season to new locations as Washington Department of Fish and Wildlife was able to collar a wolf within the Teanaway pack and gather sufficient information through that method.

Figure 1. Cascades specific specific camera locations in the Central Cascades. Camera locations indicated with yellow star.



Figure 2. Cascades specific specific camera locations in the North Cascades. Camera locations indicated with yellow star.



Table 1. Cascades specifies specific cameras were placed either in areas we reasoned were within the range of an existing grey wolf pack, or in high quality habitat where there was the potential for the presence of grey wolves or grizzly bears.

Location	Target Species	Time Period (2011)	Lure(s)	Camera Model
BC Paysaten	Grizzly bear and wolverine	March-November	Bait over bait stand for wolverine	HCO Scoutguard 550
Iron Gate	Grizzly bear	July – October	Ultimate bear lure	Leaf River and Bushnell
Chelan County	Grey wolf	September - October	Gusto	Bushnell
Colockum-north	Grey wolf	July – Camera lost	Gusto	Reconnyx
Manastash	Grey wolf	July – September	Gusto	Reconnyx
Loup Loup	Grey wolf	July – August	Gusto/canine call	Cuddeback

Table Mountain – south	Grey wolf	August- September	Gusto	Bushnell
Ingalls Creek	Grey wolf	April – June	Gusto	Several models
Negro Creek	Grey wolf	July – October	Gusto	Bushnell XLT
Jungle Creek	Grey wolf	July - October	Gusto	Reconnyx RC60
Teanaway 1	Grey wolf	July - October	Gusto	Several models
Teanaway 2	Grey wolf	July – October	Gusto	Several models
Wilson Creek	Grey wolf	August	Gusto	Bushnell

I-90 cameras

Eleven cameras were placed along I-90. Camera placements complemented ongoing research by the Western Transportation Institute and its partners in the highway corridor while building upon data that our project 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 that had been established for the Rock Knob area 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 area for habitat connectivity and wildlife passage. Some of the cameras we set with the aim of documenting specific species we hope to record within the I-90 corridor, such as pine martens.



Figure 3. Camera locations near I-90 to document species presence in a critical wildlife corridor. Camera locations indicated with yellow star.

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

Location	Number of Cameras	Time Period (2011)	Lure	Camera Model
Cold Creek	2	August	Hawbakers marten	Reconnyx
Easton	2	June – September	No scent used	Reconnyx RC60
Gold Creek valley	2	July – September	Feline fix, silent partner	Cuddeback
Lake Margaret	2	August – September	Feline fix, hawbakers	Cuddeback
Price Noble – north	1	June – September	Silent partner	Cuddeback
Price Noble – south	1	June – September	Silent partner	Cuddeback

Olympic National Forest

Five cameras were lent to our program from the Olympic National Forest to be placed in locations as selected by their biologist.

Figure 4. Olympic National Forest camera locations. Camera locations indicated with yellow star.



Equipment: cameras and lures

Cameras

We used Bushnell, Moultrie, Cuddeback No-Flash, Leaf River, and Reconyx RC55 and RC60 motion-sensitive digital cameras. Some of our volunteers provided their own private cameras which added additional camera models to our mix throughout the season in several locations.

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. We employed 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 often 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 a bungee cord sometimes added for stability.

Following lending six of our Reconnyx cameras to another scientific effort this season, we had fewer models available than in seasons past. 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, 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. The Olympic National Forest lent us several of these models for our efforts on national forest on the peninsula.

We added a new camera model this year to our inventory – Bushnell. This camera model appeared to offer many of the benefits we appreciate in our existing inventory including video, rapidfire options, and screens for pre-viewing images taken by the camera while including the new feature of sound. These cameras were also hundreds of dollars cheaper to purchase than our preferred Reconnyx models. The Bushnell cameras were largely dedicated to our grey wolf teams, at locations where we felt we needed the rapidfire and/or video options. Introducing a new model into the field mid-season was challenging: several sites gained no results due to malfunction, errors in time and date recording on images, and potentially less successful results than if we'd used models our volunteers were more familiar with, lessons learned for next season.

We also 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

We used a variety of lures, mostly commercial scent attractants ordered from trapping supply businesses and selected for each site based on species targets. Most often we applied a single lure to each camera location. At the two locations extremely close to highways we determined to use no scent at all. Lure use was recorded at each field application. (*A list of lures used at each location and application can be provided upon request.*). One location in the Cascades on the BC side of the border utilized bait, which was most often part of a cow femur.

In the Olympics, we combined scented lure with bait, following protocol provided by the Olympic National Forest for monitoring. The bait was either roadkilled beaver collected from the area, or store purchased whole-chicken when beaver was not available. We also applied lure slightly different at the site following this protocol. The only other site in the Cascades where we applied bait in combination with lure was at our British Columbia station.

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 snow tracking season and prepared protocols for our remote camera work specific to the camera models. Slightly different protocols and data sheets were used for our work in the Cascades and Olympics, as they were developed with different scientific advisors. (See Appendix F for a sample Cascades monitoring protocol and Appendix E for a sample Cascades remote camera data sheet.)

The appendix contains a Species Priority List for 2011. The list is a means of grouping wildlife into levels prioritized on the significance of a species being recorded by our project. It helps us review results for species other than those we've specifically targeted. 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: since our project is focused on rare carnivores, that includes wolverines and grizzly bears
- Less common and with smaller or fragmented populations in the project area, such as mountain goats
- Already the focus of ongoing agency studies and recovery, such as wolves and fishers

The species list has changed over the years of our program (see past reports for greater discussion on this listing and changes made by the year). In 2011, we removed smaller animals from the Level 3 list for efficiency in recording data and because they are not the primary focal species of our remote cameras. Therefore, we are not reporting them in this report. These smaller species, however, remain on our Species List for snow tracking efforts along I-90.

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). 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.

Procedures were designed to provide general direction from our office, while affording flexibility to each team leader. Installation, checks, and retrieval of cameras was scheduled by team leaders and members based on volunteer availability and the weather. Cameras were checked approximately every two to four weeks to change camera batteries and memory cards and to refresh lures. 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 used standardized data sheets.

IV. Results and Discussion

Overall, the project this year documented many common species and several uncommon and rare species. Only one camera station recorded its target species, while three camera stations recorded no photos due to technology problems and theft. Some remarkable photos and videos were captured, including a grey wolf in the Teanaway, four cougars rubbing the scented tree along Ingalls Creek, and three lynx in the Paysaten. (*See Appendix D for a sampling* of photos and our Flickr page for photos and videos http://www.flickr.com/photos/conservationnw/sets/72157627007513751/detail/.)

The data are split into three groups for reporting: Olympic National Forest, Cascades Species Specific, and I-90 cameras.

Results are reported in species "visits." Visits are defined as one or 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 3 minutes. Some judgment is used in defining this visits, but we feel the reporting system is a relatively accurate means of conveying activity at a given camera site. For instance, a group of 4 elk

could have spent 20 minutes at a camera station with a highly sensitive camera recording hundreds of individual photos of that elk group's visit to the station. Rather than report those hundreds of photos in this report, we will report the individual visit of those elk along with pertinent details, when of interest, including number of individuals in the visit and duration of the visit.

Results are only reported for species of interest to our program as listed in our methodology. Therefore we do not report photographs of birds including wild turkeys, squirrels, chipmunks, hares, or domestic animals. Our cameras did record cows and sheep that grazed through several of our sites. Photos of those animals are not reported in our results, but are mentioned in our discussion.

No results were recorded at our pilot site along Highway 97, so this site is not mentioned in our results. We attribute the lack of results from these cameras to having no scent attractant at the site due to the proximity to the roadway, and potentially not selecting the best location. The cameras were pointed parallel to Highway 97 at two locations, and would record any animal happening to approach the roadway in that one location. Since there is not an existing culvert to facilitate safer crossing or fencing that would direct animals to cross a specific locations, we simply utilized signs of wildlife presence (i.e. scat, tracks) to guide our placement of cameras. We will apply lessons learned from this effort to future years of monitoring along roadways.

The full dataset, including geoposition and exact camera locations, is available by permission only and often provided only to land and wildlife managers within our project's scope. Please contact Conservation Northwest.

Olympic National Forest

Three teams in the Olympics at Mt Elinor, Mt Rose, and Mt Washington recorded the presence of black bear, bobcat, coyote, deer, and mountain goat. There was no detection of the target species pine marten.



Figure 5. Olympic remote camera results by location

All species detections were single detections, other than two visits by deer at the Mt Elinor station.

The sites in the Olympics were chosen specifically for their habitat quality values for pine marten, so were in dense forests at high elevations. We recognized that this was a very limited effort to record this species presence on the peninsula, and that a more thorough field research effort is needed that our program could complement to truly survey this area for marten.

Cascades: Species Specific Sites

Fourteen camera stations in habitat of the Cascades targeted specific species (grey wolf or grizzly bear). These cameras recorded nine species of interest to our program: black bear, bobcat, coyote, cougar, deer, elk, lynx, moose, and grey wolf. The highest number of visits to stations were made by deer, elk, and coyote.

Lynx were only recorded at our station in the Paysaten River drainage on the British Columbia side of the border. Moose were recorded at our two most northern stations; one in the Paysaten River drainage in British Columbia and the other at the Iron Gate entrance to the Paysaten wilderness. Grey wolf was only recorded in the Teanaway landscape.



Figure 6. Remote camera results at sites targeting specific species in the Cascades.

	Black bear	Bobcat	Coyote	Cougar	Deer	Elk	Lynx	Moose	Wolf
BC Paysaten	3	0	5	0	7	0	8	2	0
Iron Gate	5	0	1	0	15	0	0	1	0
Chelan County	0	0	0	0	0	0	0	0	0
Colockum - north	0	0	0	0	0	0	0	0	0
Manastash	14	2	24	1	7	24	0	0	0
Methow Valley	1	0	0	0	21	0	0	0	0
Loup Loup	0	0	0	0	0	0	0	0	0
Table Mountain - south	0	1	5	1	0	17	0	0	0
Ingalls Creek	0	0	0	0	17	2	0	0	0
Negro Creek	1	0	0	0	1	0	0	0	0
Jungle Creek	11	0	7	0	23	6	0	0	0
Teanaway 1	0	5	5	0	27	27	0	0	1
Teanaway 2	2	1	1	1	2	0	0	0	0
Wilson Creek	3	0	0	0	0	0		0	0

Table 3. Remote camera visits by wildlife at sites targeting specific species in the Cascades by location.

Visits by multiple individuals of a species at one time were recorded at 9 of our stations this year. Herds of elk and deer visited multiple sites. Two coyotes at one time were recorded at Manastash and Table Mountain–south. Three black bears (an adult and two cubs) were recorded at Jungle Creek, while multiple bears were recorded at several stations. Four cougars were recorded in a series of videos in the Teanaway, and three lynx were recorded together in a series of photographs at the BC Paysaten station.

The location with the greatest number of different species recorded was the Manastash (just south of I-90 on the eastern slope of the Cascades): black bear, bobcat, coyote, cougar, and deer. Species richness was followed by locations in the Teanaway, then the site along the Paysaten River in British Columbia.



Figure 7. Species richness by camera site location

The only sites to record Level 1 target species were Teanaway 1 with a grey wolf and BC Paysaten with lynx.

Data is also consistent with past years monitoring results, although some species were not recorded that have been previously. For example, moose tend to only be recorded at our northeastern locations in the Cascades each year. Whereas, there was no detection of mountain red fox this year, as we have in years past. We did not target mountain red fox with our cameras this year, nor did we directly revisit high elevation sites in the Teanaway where this species was detected in the past, so this result is not surprising. Our Manastash and Teanaway locations often record a greater diversity of species and visitations by more than one individual of a species at a given time (i.e. herd of elk or multiple bears), as they did again this year.

Due to our close coordination with Washington Department of Wildlife and knowledge of the presence of the Teanaway Pack, we expected (while were still thrilled) to record their presence in that given location. In addition to the photo recording of a grey wolf in this location, numerous tracks were recorded by teams installing and maintaining camera stations in these locations. Photographs add to our knowledge of this packs physical characteristics.

None of our Methow cameras recorded members of the Lookout Pack this season. This result is likely a combination that our sites were on the periphery of where agency biologists believe the pack's territory was during this season and we suffered several technical malfunctions in the field. Through other efforts outside of this program, we continue to coordinate with Washington Department of Fish and Wildlife to monitor this pack.

In addition to recording the presence of wildlife throughout the Cascades, our cameras did document the presence of domestic sheep and cattle grazing throughout this landscape. We recorded cattle at our Methow camera locations and sheep as they came through the Teanaway. We did not do any analysis on these photographs.

No species were recorded in areas where we did not suspect them to be present, but the data does help to inform our knowledge of the diversity of species present on this landscape. The photographs can indicate physical characteristics of species and the timing of their presence in areas of the landscape including when with young. The data from this program cannot tell us more about the quality of habitat or diversity of species on the landscape, than simply recording the species present that visited our stations in a given period of time.

I-90 Cameras

Six camera stations within 0–5 miles of Interstate 90 just east of Snoqualmie Pass recorded black bear, bobcat, coyote, deer, elk, and pine marten. The highest number of visits by deer and black bear was recorded at the unscented station in the forested island between the east and west bound lanes of I-90 called Easton. This result is meaningful in that it confirms the use of this mile long forested island in between the east and west bound lanes of I-90 by wildlife, where crossing structures are proposed to facilitate safer passage into and out of the island. Although meaningful, it should not be interpreted that more wildlife are present in this location than others along the I-90 corridor. The high results are likely due to the higher quality camera model allocated to this site, and great placement of the camera in the field.

The greatest number of elk, often recorded with multiple individuals in one photograph or video, was at Price Noble-south. Our camera sites in the habitat near Price and Noble

Creeks on both sides of the highway have often recorded the highest diversity of species in past seasons of both our winter and summer monitoring.

The only site where pine marten was recorded was Lake Margaret on the north side of I-90. The video was recorded by one of our cameras in late July, which later than we typically record pine martens in the I-90 corridor. Of note, this is the only site in our entire program this year that recorded this species, where traditionally some of our species specific cameras in more remote habitats with dense forest record marten.



Figure 8. Remote camera results for locations along I-90

	Black bear	Bobcat	Coyote	Deer	Elk	Pine Marten
Cold Creek	0	1	0	0	1	0
Easton	5	0	2	25	0	0
Gold Creek	1	0	0	1	2	0
Lake Margaret	0	0	1	3	6	1
Price Noble - north	0	0	1	5	1	0
Price Noble - south	0	1	4	5	12	0

Table 4. Remote camera visits by wildlife in core habitat of the Cascades by location.

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

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.

Equipment

Our season confirmed many differences in the abilities of our camera equipment and models this year. Camera stations utilizing Cuddeback cameras resulted in less photos per site visit and poorer photo quality. Reconyx continued to perform well in the field by providing higher photo quality, many photos per site visit, and ease of use for volunteers. We introduced a new model this year – Bushnell. The Bushnell cameras added many new features in the field including video with sound, but the greatest technical errors in the field occurred with this new equipment. The camera was too easily triggered and/or set up to take photos continually until it ran out of memory card room or battery. We expect to overcome this limitation with greater training and experience with the new equipment and further detail provided in our field manuals.

We are likely to replace our inventory of Cuddebacks over time with other models. The Bushnell camera provides many key features at a much lower price than Reconnyx, while Reconnyx remains our top model to for using at high priority sites.

This season we also invested in higher quality GPS equipment to facilitate greater cooperation with Washington Department of Fish and Wildlife around the Teanaway wolf pack. Agencies are able to send us specific data points to guide our volunteers in the field, which required equipment that allowed us to pre-enter data for the field. The new equipment greatly improved our field accuracy and ability to collaborate with agency partners by allowing us to pre-enter GPS coordinates from agency staff guiding our program before field time. Use of GPS is something we anticipate expanding in future years.

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 volunteers with our winter programs, we are seeing a growing expertise and ability in our volunteer pool. Consistency in volunteers creates greater efficiency in our program. It leads to leadership opportunities for new volunteers in the field and more knowledgeable on-the-ground decisions about camera placement. New volunteers who live closer to the camera stations provided great benefit to our program, allowing greater camera check frequency and flexibility in field locations.

VI. Recommendations for Next Year

Looking ahead to the 2012 season, we aim to meet our overall program objectives by building upon the success of this monitoring season and lessons learned.

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

- Increase preseason training of volunteers, including mock equipment installation, GPS use, and location and/or species-specific trainings.
- Conduct discussion groups and surveys with program team leaders and long-time volunteers to share field notes on equipment and protocols, to better inform program planning.
- Continue to redirect the focus on wolverine detection to winter months with the greater snow loads, and build winter monitoring for grey wolves into the program.
- Continue to focus on grey wolf detection outside of existing known pack territories, working in close coordination with agencies.

- Expand the geographic diversity of our volunteer pool by recruiting in eastern Washington and British Columbia to better allow for increased flexibility in travel and faster response time in remote locations.
- Continue use of the video feature of the Cuddeback camera model, which allows capture of a still photograph at the beginning of the video footage, helpful in identification.
- Update protocols and training for new Bushnell camera models with volunteers.
- Acquire more GPS units that allow for pre-field time data entry of data points.
- Continue to work along priority highways with WSDOT to complement their statewide work, building off the success of the I-90 project and incorporating lessons learned in 2011 season on US Highway 97.

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.

VII. Acknowledgements

We appreciate the funding provided for this program by Washington Department of Fish and Wildlife's ALEA Program, and Wilburforce Foundation. Also thank you to the individuals who sponsored a remote camera team this year to ensure they were equipped and supported in the field: Barbara Hawkins, Frankie Zehrung, Deborah Dewolfe and Kate Stewart, Judy Chapman & Carl Johansen, Barbara Hawkins, Kevin & Mary Vermillion, Steve Hansen (sponsored 2 teams), Karen Millward, Jenifer Merkel, and Debbie Velacich.

We thank the talent, time, and guidance provided by our advisory council members including Keith Aubrey (USDA Forest Service, PNW Research Station), Paul Balle (I-90 Wildlife Bridges Coalition Steering Committee), Jennifer Bohannon (WA Department of Fish and Wildlife), Roger Christophersen (North Cascades National Park), Mike Davison (WA Department of Fish and Wildlife), Scott Fitkin (WA Department of Fish and Wildlife), William Gaines (Wenatchee-Okanogan National Forest), Don Gay (Mount Baker-Snoqualmie National Forest), Robert Long (Western Transportation Institute), Paula Mackay (Western Transportation Institute), Chris Morgan (Grizzly Bear Outreach Project), Dave Moskowitz (Wilderness Awareness School), Jesse Plumage (Mt. Baker-Snoqualmie National Forest), and Gregg Kurz (US Fish and Wildlife Service).

We appreciate our partners in the monitoring project, who provided advice, guidance, and field support to our efforts this year outside of the Cascades, including Betsy Howell (Olympic National Forest).

We appreciate the following individuals and organizations for their contribution of knowledge, coordination with our efforts, assistance in volunteer recruitment, and guidance in the field. Thank you to William Moore (WA Department of Fish and Wildlife), David Volsen (WA Department of Fish and Wildlife), Jo Ellen Richards (Okanogan-Wenatchee National Forest), Patty Garvey-Darda (Okanogan-Wenatchee National Forest), Kelly McAllister (WA Department of Transportation), Matt Wisen (WA Department of Transportation), and James Begley (Western Transportation Institute). We truly appreciate the help of all volunteers who donated their enthusiasm and time this season to the monitoring program. There is always the potential for missing people in the acknowledgements, our apologies if we have done so. Thank you one and all:

Paul Balle, Amy Gulick, Larry O'Neil, Shannon Schelinder, Kelly Staples, Cathy Clark, Kelli Young-Beach, Keri Young, William Whipple, Amy Tsui, Michael Webb, Sean Den Adel, Christine Den Adel, Trent Elwing, Tom Murphy, Kerrie Sumner Murphy, Drew Gaylord, Cathy Gaylord, Jay Friedman, Ayako Okuyama-Donofree, Jay Kehne, Richard Champlin, Lee Wales, Katie Remine, Kari Hiser, Adam Martin, Allison Lee, Brian Torrell, Doug Beeman, Guthrie Schrengohst, Ray Robertson, Marcus Bianco, Andrew Haeger, Roger Crafts, Sara Brooke Benjamin, Peter McGlenn, Don Maroney, Anna Simpson, Charlene LaCoursiere, Tana Kaiser, Taylor McDowell, Melissa Reitz, Emil Babik, Kipp Schoenleber, Mike Ruehlen, Nevada Ruehlen, Chris Lee, Prentiss Andrews, Kendall Norcott, Ron Hill, Alexandria Molina, Troy Montgomery, Leo Sooter, Benjamin Tsai, Petr Macourek, and Roger Bean.