CASCADE CITIZENS WILDLIFE MONITORING PROJECT

WINTER 2010-2011 FIELD SEASON REPORT

May 2011

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ABSTRACT

Citizen Wildlife Monitoring Project (CWMP) uses trained volunteers to record the presence and movement of wildlife, through snow tracking surveys and remote camera installations throughout the Washington Cascades. This winter marks the fifth season of data collection at fixed transects along Interstate-90, in the vicinity of proposed wildlife crossing structures between Snoqualmie Pass and Easton, and the first winter with significant highway construction in progress. Also, remote cameras, hair snags and informal tracking surveys focusing on detection of wolves and wolverines were carried out in more remote habitat above Interstate 90, Highway 2 and other locations in the Cascades. Public trainings in Seattle and Bellingham were carried out to educate recreational backcountry users to recognize and document wolverine track and sign. This year an observer reliability assessment was carried out to determine the reliability of snow tracking data collected on track transects.

The project trained over 120 volunteers in wildlife tracking techniques, and 67 people participated in formal surveys. Additionally, at least a dozen people assisted with the set up and management of a fleet of remote cameras set up over the course of the winter to detect wolverines. Snow tracking transects generally documented the typical suite of mammals detected in other seasons. Team leaders demonstrated a high degree of accuracy in identification of tracks with zero documented mistakes in identification. Neither wolverines or wolves were detected at any camera instillations this winter. Though wolverine tracking trainings were well attended, we received no relevant documentation of potential or actual wolverine tracks.

PROJECT OVERVIEW

CWMP is a joint project of I-90 Wildlife Bridges Coalition (a coalition focused on the connectivity measures in the I-90 Snoqualmie Pass East Project), Wilderness Awareness School (WAS), an environmental education organization, and Conservation Northwest (CN), a conservation organization. CWMP uses trained volunteers to monitor the location and movement of wildlife in the vicinity of proposed wildlife crossing sites along Interstate-90 in the Washington Cascades between Snoqualmie Pass and Easton and detect the presence of rare and elusive carnivores elsewhere in Washington State. The I-90 Snoqualmie Pass East Project is a 15-mile highway improvement project that includes connectivity improvement measures in fourteen connectivity emphasis areas. Construction on the first phase of the I-90 Snoqualmie Pass East Project has been initiated as funded previously by the Washington State Legislature. Construction activities were not active during the snowtracking season, but significant equipment and construction materials were present throughout the project area. A complete description of the projects goals and methods is available online at: http://www.i90wildlifebridges.org/monitoring.htm. All of the CWMP's previous reports are available online at: http://www.conservationnw.org/northcascades/reports/

SUMMARY OF WINTER FIELD WORK

Interstate 90 snow tracking transects

This year's field season was defined by a long period of poor tracking conditions persisting from the middle of January through the middle of February, which was also the most active period for transect completion. Few trips were cancelled and every transect was visited at least 4 times, except Price-Noble East which was only visited 3 times. The Gold Creek transect was visited 5 times, but the southern line was only walked in its entirety once, before the mid January when a thaw and rain events made the transect impassable for the remainder of the season.

Volunteers this winter again included over 20 students from the Learn and Serve Environmental Anthropology Field School (LEAF, http://www.edcc.edu/leaf/) a program

of Edmonds Community College run by Anthropology department chair Thomas Murphy, PhD. Collaboration between LEAF and CWMP continues to develop in attempts to make the best use of this significant resource for the project and high quality educational experiences for students.

Observer Reliability

During the pre-season team leader training, a field evaluation of team leaders was conducted gauging the accuracy of data submitted by team leaders. However, field conditions during the team leader training did not allow for an accurate assessment of volunteers skills in typical winter field conditions and therefore provided little in the way of objective information about reliability of project data. However, additionally, a random sample of track photographs submitted by team leaders were reviewed by two experts to determine correct field identification. The photographic protocol proved to be highly successful in assessing volunteer reliability and will be continued in future seasons. While some photographs did not provide enough information for definitive identification out of the field, not a single mistaken identification was documented in any photograph.

Remote cameras and informal track surveys

This season 10 cameras were placed in the North Cascades to assist in attempts to understand the extent of the range of the Cascades wolverine. The northernmost cameras were set in the Mount Baker and Suiattle River area and the southernmost along the Highway 2 corridor (from east to west: Skyline Lake, Lanham Lake, north slope of the Chiwaukums, and Irving Pass). Hair snaggers were set up at one camera at each site.

Wolverine detection protocol

For the third year in a row, the project provided free training on wolverine track identification and documentation for winter recreation enthusiasts who travel in the backcountry of the Cascades. An increased outreach effort produced larger audiences in Bellingham and Seattle than the previous year with over 90 participants between the two trainings. Based on results from the previous year, the protocol was revised and simplified to reflect the actual level of engagement and documentation effort individuals were in fact submitting (see Appendix 1 or http://www.conservationnw.org/northcascades/resolveuid/4f5dc1b63c983c1b8facf26ef9fe5984). The entire protocol was also made available at trainings and online for individuals interested in a more concerted effort to document potential wolverine tracks (http://www.conservationnw.org/northcascades/resolveuid/f0359243214df928eae526845b170abe).

The guidelines recommended for track, hair, or scat data collection were designed to streamline standard scientific procedures. First, the potential of any sign being from a wolverine was assessed by inspection and/or trailing. If the sign (tracks, hair, or scat) is determined to be potentially from a wolverine, measurements, sketches, and photographs are to be collected. Measurements included paw length and width, stride, straddle, and trough. Photographs documented individual tracks as well as trail patterns with their map coordinates. Any samples collected were not to be touched directly, and either dried or frozen after returning from the field. Reports received were then processed for quality assurance and observation reliability. Despite increased attendance at trainings, as of this publication only two sets of tracks were submitted, neither of which appeared to be the target species.

RESULTS

Interstate 90 Transects

Overall Observations

The 2011 field season produced results which are fairly typical in comparison to previous years of results from Snoqualmie pass. Overall, 95 observations were recorded, with 21% ambiguous. While the number of ambiguous observations was lower than last year, it was still higher than average, likely due to snow conditions. Of all recorded transect observations, 28% were non-track signs. Precipitation likely made track detections, as well as diagnostic observations more difficult than in other years.

Year	N obs.	N ambiguous obs.	N sign obs.	N track obs.
2007	59	9	7	52
2008	76	11	5	71
2009	130	9	12	118
2010	98	27	36	62
2011	95	20	21	74

Table 1. Number of recorded track and sign observations (obs.) from 2007-2011

This will likely be a factor that will have to be considered in future years, if the number of snow free days in winter increases. Some locations, Gold Creek in particular, were melted out a significant part of the winter season, making transect completion impossible.

Priority Species

Along the core I-90 transects no Level 1 species were detected this year, with two Level 2 species being detected, elk and mule deer. Elk were detected at Easton Hill South, and Price Noble West South. Over the past five years elk have been recorded along either side of the Easton hill transect every year. 2009 was the only other year that elk were recorded along any of the Price Noble transects and this is the first year Elk have

been recorded at Price Noble West South. Mule deer have been a consistent low frequency detection, and this year they were detected along the Gold creek south, Easton Hill north, and Price Noble East north transect, locations where, like elk, they have had high fidelity. Cougars, the only level 1 species that has been consistently detected over the years, also has a high fidelity to the Easton Hill and Price Noble transects, and presence of ungulates is likely a correlate to cougar presence along these transects. Rates of detection of priority species were typical of years past (figure 1).

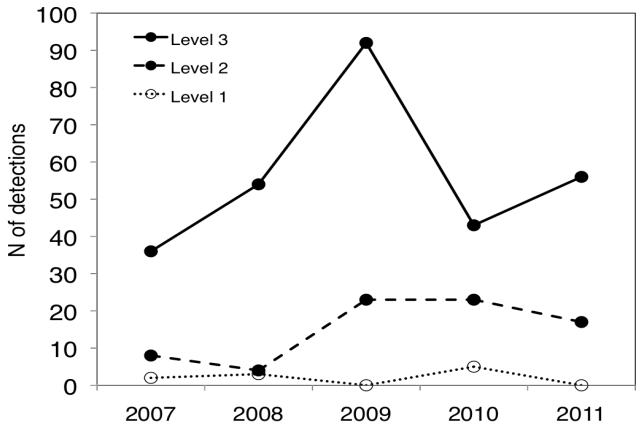

Figure 1. Number of detections (N) of Priority Level species (1 = highest concern, 3=least concern)

One Level 1 species was detected at the Hyak-Silver fir transect. American marten were detected for the first time since 2009, and this transect has been the only location that marten have been detected, likely owing to habitat differences between the Hyak transect and the rest of the immediate I-90 corridor.

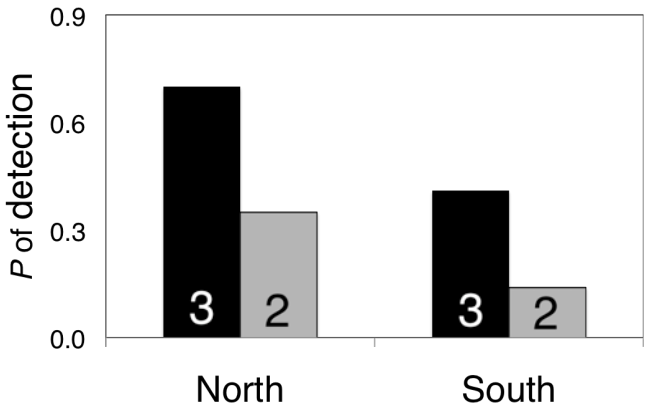

Figure 2. The Probability (P) of detecting a given Priority Level (Level 3= black, Level 2= gray) for the 2011 season, the Hyak-Silver fir transect was excluded from probability calculations.

Though in general, across all transects that were along the I-90 corridor more species were found on the north side of the highway (Figure 2). But this has not been consistent across the current study period (since 2007).

Species level observations

Overall, coyotes and bobcat have made up the bulk of observations across all sites. Coyote tend to drive the number of detections made per visit and per year, and overall detection numbers are pseudo-correlated with number of coyote detections. Detection amounts also tend to fall along trophic levels, with mesopredators being the bulk of detections, with ungulates and then apex predators the least common detection (roughly every other year). This year bobcats were detected less often then prior years, and raccoons were detected for the second time in a row, but still at low frequency. However, variations from the average may be a result of sampling effort this year, the number of transect visits resulting in no recordable observations due to snow conditions was higher this year than years prior.

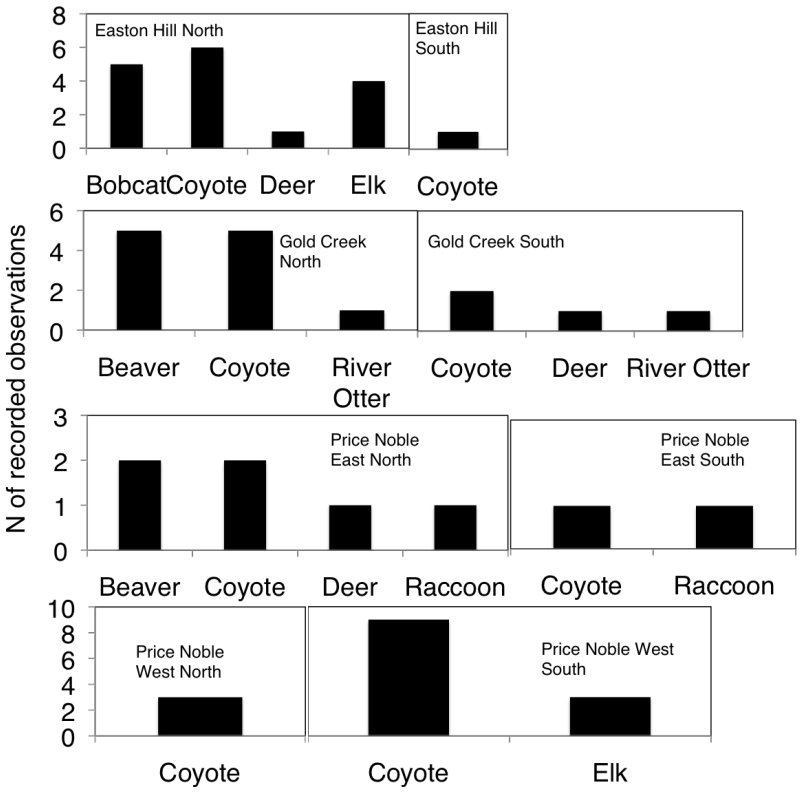

Figure 3. The Number of detections by species along each transect along the I-90 corridor.

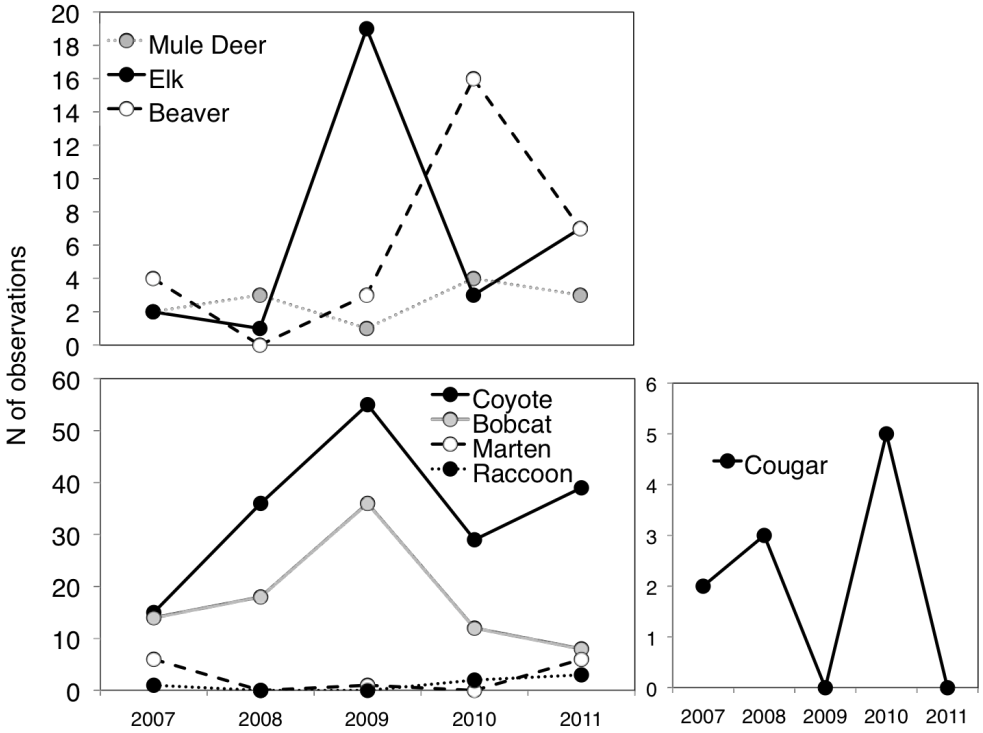

Figure 4. The number (N) of recorded species by year along the I-90 corridor. Recorded numbers per year do not include the Hyak Silver fir transects.

Interstate 90 Trailing

This year 14 trailing events occurred consisting of five bobcat, seven coyote, and three elk. Of the three speices, only a coyote was recorded interacting with I-90. A coyote was recorded crossing the Gold Creek South access road, but did not enter the I-90 roadway, instead traveling parallel to it.

Observer Reliability

Team leaders were instructed to photograph the first set of tracks that was recorded during each leg of every transect they conducted. Photos included a vertical and horizontal scale as per the projects photo-documentation protocol (see appendix 2). Once out of the field, team leaders emailed photographs to the winter project manager for analysis. On transects where no data was recorded, no photographs were submitted. This protocol collected information from 9 of 10 team leaders and all transects (The single team leader who didn't submit any observations did not record any data points with a definitive identification during the season). By arbitrarily selecting the first data point collected, the protocol avoided the opportunity for observers to submit tracks about which they felt more confident or omit data points which they were less comfortable with. See appendix 2 for the instructions given to team leaders for collecting and submitting track documentation.

Photographs collected during the field season were independently analyzed by two separate validators, each a credentialed expert specifically in the field of identification of wildlife tracks and signs (see photograph and analysis examples bellow and appendix 2 for validator credentials). In order for identification to be deemed correct by the validators, the observation had to document multiple features associated with the field identified species, show clearly specific features that distinguish the field identified species from similar appearing tracks from a different species, and have no characteristics that are atypical of the field identified species. In order for an observation to be deemed incorrect by the validators, it had to document a feature or

multiple features that are atypical of the field identified species, and possibly show characteristics typical of a different species. If the observation did not included enough information for confirmation or rejection of the field identification it was omitted.

Because level of experience and training may be an important factor in observer reliability for the project, team leaders were asked to self-assess their existing level of training and experience with wildlife track and sign identification prior to the start of the field season. With one exception team leaders had a high degree of training, with all but one having more than two weeks of training in wildlife tracking, and several having multiple years. Furthermore 7 of 10 have received one or more certifications in wildlife tracking (see discussion). Because no observations were determined to be incorrect, we could document no difference in proficiency based on experience, training, or certification level.

Number of Observers Tested	9
Total Photographs Submitted	21
Correct	14
Incorrect	0
Definitive Identification Impossible from Photograph	7
Species Identified	American marten, bobcat, coyote, elk, northern raccoon, river otter, American beaver

Table 2. Summary of observer reliability data.

Training, Certification, or Experience	Number of Team Leaders

Cybertracker Conservation Certification[a]	Level 3	7
Wildlife Tracking Intensive[b]	Participation, no certification	1
	Primary Path certification	3
	Advanced Path certification	2
Other Tracking Training	Greater than 3 weeks	3
	None outside of project trainings	1
Years Involved with Project	0-1 years	2
	2 years	2
	≥3 years	6

Table 3. Summary of team leader experience, training and certification.

a. For description of this certification see Cybertracker (2011)

b. For description of training program see Wilderness Awareness School (2011). For skill certification description see appendix 3.

Photo 1. Footprint of an elk (*Cervus elaphus*), likely hind registering directly on top of right front.

Identification features: Overall size fits within measurement range for species; delineation of distinct

imprints within the track from two clouts; rounded outside edges of clouts; tips of clouts appear rounded (though the actual tips of the clouts appear hidden behind surface snow). Track could most easily be confused with moose (*Alces alces*), a species whose typical range does not include the study area. A moose track would have a more defined point at the anterior edge of each clout and a flatter appearance to the outside edges of each clout. Mule deer (*Odocoileous hemionius*) and mountain goats (*Oreamnos americanus*) are distinctly smaller, and horse (*Equus ferus*) feet are comprised of only a single clout and would not be divided in the middle as is clearly the case in this image.

Photo 2. Footprint of a coyote (*Canis latrans*). Identification features: Overall track shape is oval and roughly symmetrical, length and width measurements are close to the median size for coyotes in the region, space between the toes and palm pad is characteristically "X" shaped, palm pad is relatively small and triangular in overall shape, outer toes are tightly tucked between the inner toes and palm pad, outer claws register lightly or not at all and snugly against anterior edge of middle toes, claws of center toes are sharp in appearance and oriented parallel with vertical axis of track or slightly angled in, the central toes and claws appear to register more deeply than the palm pad giving the track a characteristic forward cant. Wolf (*Canis lupus*), which are rare or absent in the study area, are distinctly larger. Red fox (*Vulpes vulpes*), also rare or absent from the study area, are generally smaller with distinctive features in their palm pad notably absent in this track. Domestic dog (*Canis familiaris*) is the most likely confusable species. Due to the wide variety of dog breeds, specific reliable diagnostic features for dogs are more difficult to define than for wild canines. As such, the most reliable method in the field for identifying dogs is to identify features that are atypical for any of the regions wild canids (Moskowitz 2010). Also useful is to assess the travel patterns and likely behaviour associated with the tracks if at all possible to

discern if the trail was made by a domestic animal in conjunction with human activity or a wild animal traveling independently. This photo illustrates every major characteristic typical of coyotes and there are no features in this track which are not typical for coyotes. Assessing the travel pattern or context of the tracks is impossible from the image but would have provided additional information for the field observer in coming to their identification conclusion.

Photo 3. Though vague, the faint impressions of the left hind (track on the left) and right front tracks of a northern raccoon (*Procyon lotor*) are documented here. In order to evaluate this image, the global contrast and brightness of the digital image were adjusted which helped the impressions of the tracks become clearer. Key identifying features: Typical size of both front and hind feet, characteristic orientation of a front foot registering next to a hind foot. Hind track shows impression of the heel which commonly registers, toes have a finger like (long and thin) appearance and are oriented roughly parallel with the vertical axis of the track in a shallow arc, the rightmost toe registers distinctly lower than the other toes (characteristic of the inner toe on the hind foot of raccoons), the outer toe has not registered leaving only the appearance of 4 toes. Front track: five finger-like toes are finger that radiate slightly more than the toes of the hind track and connect to the palm pad; the left most toe registers lightly but appears lower than any of the other toes (characteristic for the innermost toe on the front track of a raccoon); the posterior of the palm is concave.

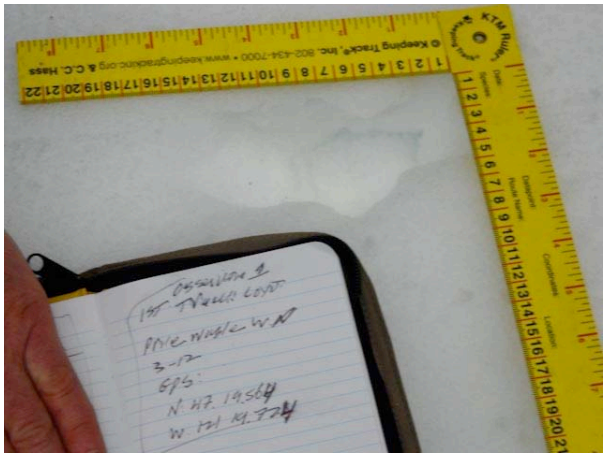

Photo 4. This track was identified as a coyote in the field but the photo does not provide enough information to definitively support or refute this. The general size and apparent shape of the track is generally consistent with a coyote track, but also several other species commonly found on transects.

Remote Cameras

By the end of the season over 10,000 photos were taken, none of which yielded a wolverine image. American marten (*Martes Americana*) was most common followed by gray jay (*Perisoreus canadensis*) , and this trend was general across each camera location. One probable coyote (*Canus latrans*) was detected at the Skyline Lake camera. American Marten hair was gathered at the Lanham Lake and Skyline Lake sites, but was not needed by researchers. No target species hair was detected or analyzed. The large magnitude of pictures is also due to a number of American marten deciding to den below camera locations.

Informal Wolverine Tracking Data

Despite an increase in attendance at trainings and a simplified data collection protocol, only two track samples were submitted by members of the public this winter, both of which were identified as species other than wolverine.

Volunteer Effort

This season marked the largest volunteer effort yet with 67 people (including 12 team leaders) participating in snow tracking transects alone.

Number of Transect Volunteers	67
Number of Remote Camera Volunteers	12
Transect Volunteer Hours	1572
Project Leadership Volunteer Hours	169
Remote Camera Volunteer Hours	not tracked

Table 4. Summary of volunteer hours for the project.

DISCUSSION

Observer Reliability

Problems with observer reliability which negatively influence the validity of data collection is a common concern for both citizen science research projects (Fitzpatrick et al 2009, Cohn 2008, Delaney 2007, Boudreau and Yan 2004) and any data collection methods which relies on field identification of indirect evidence of a wildlife species presence (e.g. tracks or other signs) (Evans 2006, Heinemeyer et al 2008, Ulizio et al 2006, Halfpenny et al 1995). CWMP uses both a wide number of volunteer observers and identification of footprints detected and (primarily) identified in the field. However, CWMP has accounted for potential observer reliability in citizen science and wildlife tracking through strategic study design and through the use of highly trained volunteers as team leaders.

Studies which have compared the accuracy of data collected by inexperienced and experienced observers, and volunteers and trained professional have shown varied results. A study which tested the reliability of highly skilled wildlife trackers in Africa documented a very high level of observer reliability (Stander and Ghao 1997). An evaluation of professional wildlife biologists in Texas who had been collecting data on river otters through track identification demonstrated a high degree of inaccuracy (Wharton 2006). Evans (2006) documented that "experienced" observers were significantly more accurate at track identification than "inexperienced" observers. Through the same evaluation process Wharton (2006) documented an increase in observer reliability in wildlife biologists who went through a rigorous wildlife tracking evaluation process developed by Cybertracker Conservation (2011).

To account for potential issues with data reliability, the project design and data collection protocol has multiple facets to ensure data collection is accurate. These include: 1. specific training to volunteers in track identification techniques and common and rare tracks encountered on transects; 2. the option to record tracks as "ambiguous" rather than "guessing" at identification; 3. a protocol for collecting photos and measurements of ambiguous tracks for further analysis and identification out of the field by either the observer or project manager; and 4. selection of well trained team leaders who are ultimately responsible for field identification and data collection. Furthermore, a protocol for extensive documentation of tracks identified as being made by high priority rare species ensures that these data will have documentation that is reviewable out of the field. Finally, a protocol for searching for and collecting DNA samples from trails of putative Level 1 species encourages the collection of further evidence of these species' identity.

Thus far, informal assessment of observer accuracy from field visits by the project manager and analysis of photographs submitted by volunteers suggests that reliability of track identification is high. However, until this season, a systematic assessment of accuracy of all track identification data had not been done. The lack of any clear mistakes in photographs submitted by team leaders suggests that observer

reliability is likely high. However, a small total sample size and a high percentage of unidentifiable photographs (33%) do not allow for more definitive conclusions from this year's data.

Unverifiable images do not test the accuracy of the field observer but the quality of the assessment method. Because of this, the collection protocol will be revised for the next field season to attempt to reduce the number of unverifiable submissions. In many instances, definitive documentation of tracks and other indirect signs of wildlife require more than a single image and might include field sketches, notes, and measurements (Halfpenny et al 1995). Revisions will include the submission of more than one image per data point to allow for the field observer to document as much evidence as is required to make a definitive identification, and the submission of additional field notes in conjunction with the submission, mimicking the project protocol for documenting Level 1 species.

Team leaders responsible for data collection have an overall high level of training, experience, and certification. Of 9 team leaders who submitted data this season, 7 have participated in at least one Cybertracker Conservation evaluation, all of them certified as Level III, one step bellow the highest certification for Track and Sign certification and signifies they have demonstrated the ability to "interpret the spoor of medium to large animals and…have a fair knowledge of animal behaviour" (Cybertracker 2011). Six of the team leaders have attended the Wilderness Awareness School Wildlife Tracking Intensive, a year-long, college accredited training program for wildlife trackers (see appendix 3 for skill set description). Only a single team leader had no training or experience beyond what was received from CWMP. This was the only team leader who did not record any definitive identification of species during the field season and therefore did not submit any observer reliability observations. This point brings up a question, which these data cannot answer, regarding the effectiveness of various team leaders in detecting tracks and sign to begin with. While tracking in snow generally creates an environment were detection rates more consistent across a landscape than other substrates (Heinemeyer et al 2008), it is still possible that

detection rates would continue to vary between observers to some degree.

Remote Cameras

There were zero detections of target species this season. Winter can lead to difficult and uncertain field conditions. Avalanche hazard and the general hostility of winter weather led to the inability for a camera to be placed at Kendall Peak north of I-90. One camera on Mount Baker fell victim to a catastrophic avalanche during a week of extreme avalanche danger. The camera was located in an area near a large mountain goat herd, and was a strong candidate for wolverine detection. Tana Beus, the lead on the camera noted the avalanche was nearly ¼ a mile wide and it is very unlikely the camera, or its data, will be retrieved. Other cameras were placed outside of avalanche terrain, and had their own set of drawbacks. Cameras set at lower elevations (4500-5000ft) were prone to more non-target species detections. Multiple American martens ended up denning near camera sites, and it may be necessary next season to move cameras if wildlife become habituated to bait.

Citizen Science

With this season, we have 5 years of successful use of trained citizens carrying out monitoring aspects of this project. In addition, the use of a leadership team composed of a small number of volunteers and a single paid staff member continues to prove to be both efficient and highly effective at meeting the project's goals. Using the field team structure of highly trained team leaders working with several entry level volunteers, the project has continued to maintain a high degree of quality in data collection while also providing excellent educational experiences and recruiting future team leaders.

While we reached a greater number of people during public trainings for wolverine identification and simplified the data collection structure, we received no submissions of potential wolverine tracks as a result of this. Further refinement of this part of the project will be required to better access the large volume of potential observations of back country enthusiasts in the Cascades and elsewhere in the state.

RECOMMENDATIONS FOR NEXT FIELD SEASON

At the end of the snow tracking transect season, feedback was solicited from team leader. Recommendations here include several items suggested from this process.

1. Equipment: The handheld computers should receive new batteries more frequently. The new batteries provided mid-season were greatly appreciated by the team leaders. Other organizations reportedly have similar issues with batteries for handhelds when they are left unused for long periods as ours are.
2. Maps: The map of the Hyack/Silver Fir transects should be revised to account for discrepancy between map details and actual topography on the transect.
3. Online trip schedule: The Google document and team leaders' free access to it should be maintained for next year. It was suggested that we notify team leaders that coming to the volunteer training gives them an advantage in scheduling trips. They will have their teams by the conclusion of the training and can choose trips that afternoon. This may increase team leader participation in the trainings, as well.
4. Flagging: Once flagging trips were carried out, no flagging problems were experienced this year. The recommendation for next year is to carry out flagging trips for each transect prior to the start of the season unless the first team lead assigned to a transect is capable of flagging it.
5. Team leader retention: The initial steps taken to assess observer reliability in the project suggests that team leaders are a very important asset to the quality of the project's data set. While the project continues to have a high degree of team leader retention, a survey of team leaders past and present regarding what would

encourage their retention should be carried out in the off season.

6. Informal tracking data: Review and revise our efforts to engage the recreational public in informal data collection to help detect wolverines. Photographs of potential wolf tracks sent by members of the public suggest that expanding our efforts to outreach about species other than wolves might be fruitful. As backcountry travel increases in the spring, adapting our outreach efforts to access this audience as well might also be of value.

ACKNOWLEDGEMENTS

As with every year, many hands went into the completion of another successful field season. Mallory Clarke, as she has been every year of the project, spent many hours carrying out project leadership and management tasks before and during the field season and was instrumental in delivering pre-season trainings. After the season, she solicited feedback from team leaders and contributed to the seasonal report. Without her, it is unlikely the project would be nearly as successful as it has been. Adam Martin also spent many hours preparing for and implementing the field season as part of the project leadership and carried out GIS and data analysis of this season's data for this report. **Error! Reference source not found.** organized a very successful wolverine tracking training in Bellingham and provided ongoing feedback on the refinement of our data collection protocol. Kit McGurn organized the similarly successful Seattle training. **Error! Reference source not found.** donated his time to evaluate observer reliability photographs and reviewed the corresponding section of the project report.

Thank you to all of the transect volunteers who participated in this years field work: Alex Molina, Alexie Sterhov, Andrew Haeger, Anna Michel, Ariel Davidson, Ayako Okuyama-Donofree, Becca Reilly, Ben Hagerdorn, Cathy Gaylord, Chanzelle Diaz, Chris Russell, Dan Gusset, Debbie Welsh, Denise McElhinney, Doug Stevens, Drew Gaylord, Ean Olsen, Eric Dee, Guthrie Schrengohst, Helen Anderson, Jamie Bails, Jay Friedman, Jocelyn Oakley, Kaili Slate, , Karin Jenkins, Kerrie Murphy, Kim Des Rochers, Kit McGurn, Kristine Deleon, Liam Holmes, Marissa Smith, Mathew Zoba, Maureen Corlas,

Mike Holman, Nate Johnson, Nevada Ruehlen, Nicole Espe, Paul Zoba, Richard Champlin, Rinky Wong, Robert Holbrook, Samantha Aiguier, Sean Byrd, Sean Den Adel, Shannon Schelinder, Terry Fasthorse, Teryani Riggs, Tik Ling, Tim Gibbons, Tom Hagerdorn, Tracy Durnell, and Tricia Enfield. And a very special thanks to all of the hard work of our diligent transect team leaders: Mallory Clarke, Kyle Koloini, Ashely Bies, Kari Hiser, David Snair, Brian Booth, Joe Kiegel, Adam Martin, Jonathan Goff, Thomas Murphy, Kelly Staples and Chris Byrd.

Thank you to all the hard working volunteers who put their time and energy into wolverines cameras this winter. Thank you to the Lanham Lake crew, Justin Honeywell, Jim Clark, Kimi Washer, Zach Moore, as well as Drew and Cathy Gaylord for huffing up to Skyline Lake so many times. Thanks to Tana Bues and her team up at Mount Baker: Janienne Liccardi, Alan Kearney, Kevin Kaiser, Sam, Allen, and Tess. Thanks to Pete Jenkins and his team: Rachel Greenburg, Samatha Goff, Julie Weiss, Chase Edwards. Everyone did such stellar work, with early mornings, long drives, a difficult snow season, tiring walks, getting beaver lure scent in cars or clothes, raw meat on hands or face but getting to see some beautiful backcountry while doing it.

Financial support for the 2010-2011 program was provided by Washington Department of Fish and Wildlife's ALEA grant program and the Wilburforce Foundation. We truly appreciate this support to keep our volunteer teams equipped, trained, and assisted with their travels. Thank you once again to the North Bend Starbucks Lobby Store #3216, the store manager, Linda Porreca, and all of the employees of the store, for the continued use of closet space to store our field equipment during the winter field season, providing a meeting location, and appropriately caffeinating our data collectors.

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APPENDIX 1: Simplified Wolverine Track Documentation Protocol

Wolverine Track and Sign Documentation

Abbreviated Protocol for Slacker Backcountry Powder Gangstas' that can just barely stop carving the sweet backcountry freshies for a second to document a mythical endangered alpine carnivore.

FIELD MATERIALS NEEDED	
Paperwork	**Recommended Equipment: (NOT PROVIDED HERE)**
❑ Wolverine track Identification sheet ❑ Photo-documentation guidelines	❑ 5 index cards ❑ Camera ❑ GPS unit ❑ Topographic Map ❑ scrap of paper/pencil

Procedure for Potential Wolverine Tracks:

1) Select the clearest tracks for photographs. Consider photographing tracks in a variety of locations if possible.
2) When ambiguous or unidentifiable tracks are found, the first step is to search the area for better tracks of the same animal. If there is a trail you can follow, this is one way you may discover clearer tracks for that individual. In general, look for where the creature has entered more sheltered areas away from direct sunlight, wind, further snowfall, or whatever has likely obscured the tracks.
3) Photograph tracks, trail patterns, and other signs as per photo-documentation procedures below.

Photographic Documentation Procedure: (see appendix for diagrams and further instructions)

General:	Take multiple photographs to ensure you get a quality shot.	
	Take at least one picture of the track that includes a card in the picture with the following information:	• Date • Location Observer name. • *GPS coordinates (if available) and datum used (UTM NAD 83 preferred)*
Individual tracks:	Take photo looking directly down on track to reduce distortion.	
	Include two scales, preferably rulers, one running lengthwise, the second widthwise. *(Collapsible ski poles with cm calibrations showing also work)*	
Track patterns, trails, other signs:	Include a scale of some sort. Leaving the scale you used for photographing an individual track on the ground by that track to give a reference for where that track sits in the pattern.	
	Try to take picture looking straight down on trail to reduce distortion. If this is impossible due to size of trail, include scales both near and far to account for distortion.	
	Including a person in a photo can help with scale for larger frames.	

SEND US YOUR DATA!

Once you come out of the field contact CWMP via phone or email. If you email photos please also include a description of where they where/when they were taken and the best way to contact you for follow up.

Immediate communication is highly valued as strong evidence may solicit a hasty follow up response in the area of discovery that might include setting up remote cameras, hair snags or follow up tracking surveys.

David Moskowitz (Wilderness Awareness School) 425 891 4745 davem@wildernessawareness.org	Jen Watkins (Conservation Northwest) 206 675 9747 x203 jwatkins@conservationnw.org

Citizen Wildlife Monitoring Project *revised 10/7/10*

APPENDIX 2: Observer Reliability Photo Protocol, Validation Method, and Validator Credentials

Observer Reliability Photograph Guidelines

Field Season 2010-2011

Following the standard photo-documentation procedures for the project, photograph the first set of tracks you record on each side of your transect. Photograph should be of one individual track or two together (such as a front and hind from an indirect register). Select tracks that will be clearest in photograph. Take multiple photos ensure you get a good exposure if needed. Email the two images (one from each side of the highway) to davem@wildernessawareness.org. DO NOT EMAIL MORE THAN 2 IMAGES. If you take multiple photographs in the field, select the best photograph of the collection to send to Dave. It must be of the first data point you collect on each side of the highway.

Photograph Validation Method

Each validator viewed submitted photograph on a computer screen using Apple Preview or Adobe Lightroom. In some instances, validators adjusted global image settings to increase contrast or decrease brightness in order to accentuate details of photographed tracks. Some observers submitted additional contextual information about the tracks, though this was not specifically a part of documentation protocol.

Validators first attempted to determine the actual identity of the photographed tracks based solely on information within the photograph and then with contextual information if provided. If definitive identification was possible this was compared with the field identification provided by field observer. If a photograph was inconclusive by itself but contextual information clarified identification, this was noted. If the validator determined definitive identification was not possible based on the photograph, this finding was compared with the field identification to determine the appropriate category to label the observation. Photographs were classified into 5 categories:

0	Incorrect: Observer field identification of tracks is definitively incorrect. Track characteristics in photograph rule out the possibility of being made by the stated species.
1	Indiscernible based on photo: Photograph does not provide the validator with enough information to confirm or refute the field identification. Not enough information is available to make any inferences about the identity of the track maker. There is no information in the photograph that eliminates the field identified species as the possible track maker.
2	Likely correct but photo is inconclusive: Photograph does not include enough information to allow for definitive identification, perhaps because key details are lacking for differentiating species with very similar tracks (e.g. coyote versus domestic dog), but based on what is present the field identification is the most plausible identification based on contextual information.
3	Correct based on photo and associated evidence provided: Field identification is definitively correct based on information in the photograph and accompanying contextual information provided by the field observer. Information in the photograph is insufficient by its self for definitive identification
4	Correct: Field identification is definitively correct based solely on information contained within the photograph. Tracks show multiple characteristics associated with identified species including features that distinguish it from similar species. There are no characteristics of the tracks that are atypical of the species identified.

Validators first attempted to determine the actual identity of the photographed tracks based solely on information within the photograph and then with contextual information if provided. If definitive identification was possible this was compared with the field identification provided by field observer. If a photograph was inconclusive by

itself but contextual information clarified identification, this was noted. If the validator determined definitive identification was not possible based on the photograph, this finding was compared with the field identification to determine the appropriate category to label the observation.

Validator Credentials:

David Moskowitz, program manager for the winter snow tracking components of CWMP, is the author of a comprehensive field guide to wildlife tracks and signs in the Pacific Northwest.[1] He is certified in the Pacific Northwest as a Track and Sign Specialist through Cybertracker Conservation, an independent wildlife tracking certification organization.[2]

Brian McConnell[3], a former team leader for CWMP, is certified in the Pacific Northwest as a Track and Sign Specialist, and is a Senior Tracker, and Evaluator through the independent wildlife tracking certification organization Cybertracker Conservation.[2] He is a contributor to the book Practical Tracking[4] and he provides trainings in wildlife trailing.

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[1] Moskowitz, D. 2010. *Wildlife of the Pacific Northwest: Tracking and Identifying Mammals, Birds, Reptiles, Amphibians and Invertebrates.* Timber Press, Portland Oregon.

[2] Cybertracker Conservation. Tracking Evaluation Description and Methods. http://www.cybertracker.co.za/index.php?option=com_content&view=article&id=65&Itemid=46. (accessed April 5, 2011).
Cybertracker Evaluations in North America. http://www.wildlifetrackers.com/evals/. (accessed April 5, 2011).

[3] **Error! Reference source not found.**, Everson, Washington. bantytracks@earthlink.net

[4] L. Liebenberg, A. Louw, and M. Elbroch. 2010. *Practical Tracking: A Guide to Following Footprints and Finding Animals*. Stackpole Books, Mechanicsburg, Pennsylvannia.

Appendix 3: Wilderness Awareness School Wildlife Tracking Intensive Completion Criteria

Wilderness Awareness Tracking Intensive Completion Criteria

Criteria For Participation Certificate: PRIMARY OR ADVANCED PATH

- Attendance of all class weekend (unless prior arrangements are made with the instructors of the class.
- Full participation in all class activities to the best of the abilities of the individual.

Criteria For Successful Completion: PRIMARY PATH

- Attendance of all class weekend (unless prior arrangements are made with the instructors of the class.
- Full participation in all class activities to the best of the abilities of the individual.
- Successfully completes all homework and assigned readings.
- Completion of 25 Tracking Journals in either the Shikari Format or another style agreed upon by student and instructor. (15 mammals, 3 birds, 2 others, 5 more of any one species of mammal)
- Demonstrates ability to recognize clear common sign of large and medium sized animals to family, genus, and species (Specific species list to be provided).
- Demonstrates ability to consistently recognize common gait patterns for medium and large sized animals.
- Demonstrates ability to apply basic natural history knowledge to common tracking situations.
- Completion of an Individual Development Plan at the start of the course and a self-evaluation of progress at the end of the class (accompanied by a narrative written by instructors).

Criteria For Successful Completion: ADVANCED PATH

- *Completion of all primary path requirements.*
- Completion of independent research project and presentation on the project on the final weekend of the course. Details of each project will be dependent on a structure agreed upon between student and instructors.
- Demonstrates an ability to consistently recognize clear common sign of large, medium animals to a family, genus, and species level; recognizes small animals to an order and family and in some instances genus and species (See attached species list).
- Demonstrates an ability to identify partially obscured, incomplete, or unusual tracks/signs of common species through use of natural history knowledge and deductive/inductive reasoning.
- Demonstrates an ability to apply natural history and ecological principles to make reasonable interpretations of animal behavior through tracks and sign and predict the future behavior of the animal in question.

revised 10/22/09

Wilderness Awareness Tracking Intensive Completion Criteria

NOTE: Skills demonstration will be assessed and discussed throughout the course during field sessions of the class. These are not dependent on performance during final evaluations alone. Species lists below may be adapted due to actual field experience throughout the duration of the program.

Species List for Primary Path

Opossum
Snowshoe Hare
Cottontail spp.
Beaver
Muskrat
Tree squirrels
Marmot
Porcupine
Coyote
Fox (Gray or Red)
Domestic Dog
Cougar
Bobcat
Domestic Cat
Black Bear
Raccoon
Otter
Mink
Striped skunk
Elk
Mule/Blacktail Deer
Perching bird
Corvids
Game birds
Ducks and gulls
Herons and egrets
Shore bird
Toad and frog

Species List of Advanced Path

All species listed for Primary Path
Shrew species
Mole Species
Pika
Nutria
Red/Douglas Squirrel
Ground squirrel species
Chipmunk species
Woodrat species
Old World rat species
Deer mouse species
Vole species
Kangaroo rat species
Pocket Mouse species
Canada lynx
Wolf
Grizzly bear
Weasel species
Badger
American marten
Wolverine
Bighorn Sheep
Mountain goat
American robin
Red-winged black bird
Magpie
Crow
Raven
Bald Eagle
Owl species
Great Blue Heron
California Quail
Grouse species
Pheasant
Snipe
Spotted Sandpiper
Killdeer
Duck species
Gull species

revised 10/22/09