

## WOLVERINE: Species on the Edge?

**A**re wolverines on the edge? This is an important question if we are to conserve these remarkable icons of the Rocky Mountains. But, for such an elusive animal, it is not an easy question to answer. A decade ago, the United States Fish and Wildlife Service (USFWS) concluded that not enough was known about wolverines to make a decision about listing them under the Endangered Species Act (ESA).

WCS's Bob Inman, along with a team of intrepid field biologists, stepped into the picture ten years ago to fill in crucial gaps in the scientific knowledge of wolverines. They radio-tracked wolverines in some of the most extreme mountain peaks of the Rockies, braving negative 20 degree weather and precarious helicopter flights to access the high-elevation avalanche terrain where wolverines make their home. In order to get all this information into the hands of decision-makers, they spent the past year analyzing maps and models, processing over 1,000 camera-trap photos, and running formulae to publish what is now the most up-to-date work to guide wolverine conservation.

The first publication resulting from this study, in *The Journal of Wildlife Management*, confirms why wolverines live at such low population densities. In winter, while bears hibernate and other species move to lower elevations, wolverines remain in high mountain basins, patrolling their frozen territories—

as much as 500 square miles per male—in search of meat that they then systematically cache in 'iceboxes'. The study sheds light on how wolverines are adapted to resource-poor environments, even nursing and raising young successfully in below-freezing conditions. By using refrigeration to plan ahead for this challenging season, wolverines reduce competition with other carnivores.



One in a series of photographs that provide an interesting look at behavior associated with a wolverine den. This wolverine is the presumed father of the cub in the nearby den.

By articulating this aspect of the wolverine's ecological 'niche', WCS has advanced understanding of why wolverines will always exist in low densities. Furthermore, the study allows for better estimates of wolverine occupancy in parts of their current and historic ranges, like the Rocky and Sierra Nevada Mountains. Unfortunately, the wolverine's very specific adaptations to frozen environments—large snowshoe-like feet, tenacity and caching behavior—will not be sufficient to protect their life cycle as snow lines creep higher and melts occur earlier. To explore in detail how

climate change may impact maternity and litter success, Bob and co-authors published a second paper presenting the problems of melting caches and territorial competition from lower elevation species.

WCS has also assessed the best places for wolverine survival as the climate changes. One of the top potential climate 'refugia' is Colorado, which was part of the species' historic range. With 40 peaks over 14,000 feet, restoring wolverines to historic habitat in Colorado may be the best chance for resilience against climate change. In addition, wolverines must traverse valley bottoms to reach mates and to set up new territories. As our western mountain ranges become physically isolated from one another, WCS continues to map priority corridors for wolverines and to develop the techniques and understanding that will allow connectivity planning and protection across states and between the US and Canada.

Wolverines have been called fierce, often taking on animals many times their size in defense; they travel vast distances over rugged terrain and persist where other species simply cannot. But the species exists only on the very edge. In 2010 the USFWS issued a finding that increasing threats from climate change and habitat fragmentation may exceed the capacity of these tenacious animals to persist, and that wolverines warrant protection under the ESA (at that time funding constraints precluded further action under the ESA). The USFWS cited the work WCS more than 50 times in support of this finding. WCS is now working with USFWS officials to develop a comprehensive strategy to ensure that wolverines to continue to live on the edge.



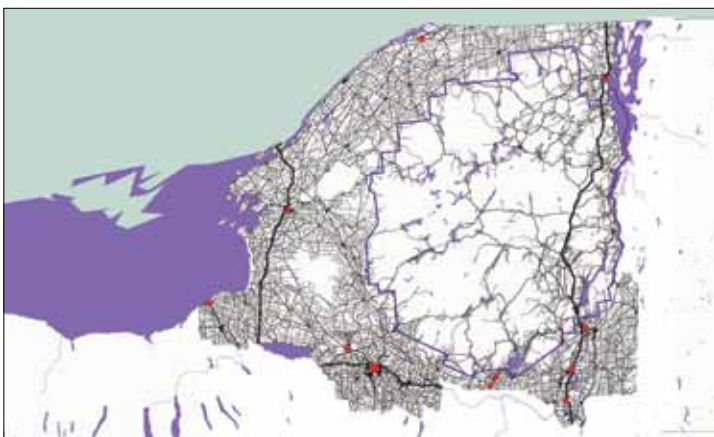
## CONSERVATION DESIGN FOR WILDLIFE

Wildlife in the Northern Forest are sensitive to human development, which can make it challenging for species that must move through the landscape in order to survive. Typically, land-use planning doesn't consider the importance of habitat connectivity; fortunately WCS' work to mitigate the impacts of development on wildlife is making a difference in the Adirondack Park. Agencies are beginning to consider the 'ecological impact zone' of new homes, based on our work, when reviewing proposals and even suggesting alternative designs with fewer impacts on wildlife.

Roadways pose a barrier to wildlife movement even in intact areas like the Northern Forest. A look at the map of roads in the Adirondacks might suggest that road density is low and that impacts within the Park boundary are limited. Results from our work on residential housing remind us that development need not be highly visible to be a threat. In fact, a single new house constructed in an exurban setting has an 'ecological impact zone' of 20–30 acres, affecting wildlife over this vast area, even if the physical landscape remains forested.

A recent WCS study illustrates the overall impacts from roadways on some species extend 200 meters into adjacent forests (a result similar to what we found for the house-distance effect). We found that narrower, lower-traffic roads with closed forest canopy had less impact on songbirds than wider, open roads with higher traffic volumes. Likewise, we observed that many bird species seem attracted to road edges, presumably because road edges offer resources such as more diverse food sources. Further research could reveal whether road edges serve as an ecological trap for birds—enticing them but making them more susceptible to increased road mortality or predation—and could address the impacts of roads on birds' nesting success, and on mammals, reptiles and amphibians.

Our partners in the Northern Forest are looking to us to quantify the 'ecological impact zone' of roads to complement our housing work so that both are considered when reviewing new development projects. With this information, planners are able to design projects that more effectively protect the environment and minimize habitat disruption.



Map of roads in the Adirondacks, from *The Adirondack Atlas*.

## ARCTIC ALASKAN BREEDING BIRDS AND CLIMATE CHANGE

In the Arctic, climate change is occurring at nearly twice the global average rate. Arctic Alaska is the destination for up to 90 bird species, most notably shorebirds and waterfowl that flock there in the millions to breed during the brief summer. Many of these birds rely on wetland and lake systems created in part by permanently frozen ground (permafrost). Warming temperatures have already begun to affect the depth of the permafrost, timing of the transition from winter to spring, and coastline erosion from storms. The populations of several species, like the spectacled eider and the buff-breasted sandpiper, are already declining, yet wildlife managers are just beginning to understand how climate change might impact bird species in Arctic Alaska. In 2011, WCS assessed the 'climate change vulnerability' of Alaskan breeding birds to create a ranking to target conservation and management action, an important first step to protect species that are most sensitive to climate change.



Common eiders are 'highly vulnerable' because they rely on barrier islands that will erode with sea level rise.

WCS engaged over 50 experts from 20 institutions to evaluate the sensitivity of each species to existing and emerging climate change impacts. 'Sensitivity' refers to the innate characteristics of the species, which limits their ability to respond to climate changes. We combined the sensitivity information with various scenarios of projected temperature increase, moisture change, sea-level rise, and other environmental conditions and synthesized this with data and expert knowledge.

The end result was a ranking of 54 bird species from 'highly vulnerable' to those that will likely remain stable, to species that may actually benefit from landscape changes to come. For instance, common eiders will likely become highly vulnerable because they are dependent on barrier islands for nesting, many of which will erode. And because arctic warming is only part of the cumulative impacts migratory birds encounter along their routes, we also incorporated information on the sensitivity of 17 highly migratory bird species.

In December, WCS led a 30-person workshop to gather feedback and finalize the report, available in the summer of 2012. The outcomes will provide science-based prioritization for conservation in the region and a model for a future vulnerability synthesis for Arctic mammals.



## FINDING SAFE PASSAGE FOR WILDLIFE ON HIGHWAYS

Overland migration is essential for many species, including pronghorn, mule deer, and elk. WCS has long studied the paths of migration to help save them, such as Wyoming's Path of the Pronghorn. While sprawl and energy development pose obstacles to migrating wildlife, busy highways and their associated infrastructure are a growing concern. Highways fragment wildlife populations into smaller, more vulnerable groups; increase wildlife mortality; and significantly disrupt the process of migration—a time when animals are already exhausted.

In western Wyoming, WCS found that US 191 bisects the Path of the Pronghorn—the only corridor for migrating pronghorn in and out of Grand Teton National Park—to such a degree that it threatens to sever this ancient route. Each year, near the 'bottleneck' at Trappers Point, thousands of animals cross US 191 and create a perilous situation for humans and wildlife.

The Wyoming Department of Transportation, armed with data from WCS, is stepping up and investing \$9.7 million to reduce vehicle-wildlife collisions here by installing highway-crossing structures—eight overpasses and underpasses are under construction. This past fall, a team of WCS biologists monitored the behavior of pronghorn heading south to their winter range. The team will work directly with construction designers to help them understand where and why animals might get stalled and what structural attributes facilitate successful crossing of the highway. Since crossing structures are a relatively new tool for conservation, it is crucial to align future design and placement with the actual needs of wildlife.



Pronghorn cross U.S. 191 during their annual migration.

Our team observed over 1,000 pronghorn crossing the highway at Trapper's Point and were pleased that the behavior of migrating pronghorn suggests the animals are likely to learn quickly how to use the overpasses, resulting in successful—and safe—crossings over US 191.

Many questions remain about how best to protect migrations in light of our expanding human footprint. On-the-ground work by WCS ensures that wildlife science informs major conservation investments. As more transportation authorities consider highway crossings, WCS is committed to establishing the best methods that will yield the most effective conservation.

## STOPPING THE SPREAD OF WHITE NOSE SYNDROME

White Nose Syndrome is a distinctive fungal disease, characterized by an unusual white substance—the fungus—found on the muzzles of bats, which has killed more than five million bats across Eastern North America. In Canada the disease is now associated with the death of over one million bats and with the rapid declines of several bat species—including little brown bat and tri-colored bat.



Bat infected with white-nose syndrome.

White Nose Syndrome was first recorded in Albany, New York in 2006; since then it has spread to 16 states and four Canadian provinces at a rate of approximately 200 km per year. The disease is still a bit of a mystery, but it causes bats to wake up frequently during hibernation, which means the animals use up their fat reserves too quickly. Bats become active as a result of the fungus and leave the cave in search of food. Because the insects the bats feed on are not available in winter, the bats often die of starvation. The impact of the epidemic is considered one of the greatest threats to a species group in over a century, and it is critical to understand the mechanics of the disease's spread before it takes hold in the western provinces.

Cori Lausen recently joined WCS Canada to research winter bat ecology in anticipation of the spread of White Nose Syndrome into western Canada. Cori is working in British Columbia and Alberta where many vulnerable—but so far unaffected—bats reside. Surprisingly, little is known about what bats naturally do in winter and it is also unknown if and how White Nose Syndrome will affect western bat species. Bats in the West regularly make cold winter flights outside caves and do not seem to roost in large groups like they do in the East. British Columbia has the largest bat species diversity of any province, with several species of conservation concern federally; thus focus will be on locating hibernacula (bat hibernation sites) and understanding overwintering behaviors of bats in B.C.

So far, Cori has conducted acoustic monitoring at 29 sites, mist-netted 102 bats and radio-tracked 9 bats. She has also conducted several public outreach and school presentations.

### COMBATING U.S. MILITARY DEMAND FOR WILDLIFE PRODUCTS



WCS / Z. Smith  
Soldiers learn about illegal wildlife products.

As part of an innovative partnership to curb illegal trade in endangered species parts and products, WCS and the U.S. Department of Defense (DoD) created a video, *Caught in the Crosshairs: Combating the Illegal Wildlife Trade in Iraq and Afghanistan*, to inform U.S. military personnel about the consequences of buying illegal wildlife products when deployed or stationed overseas. The video was unveiled in 2011, narrated by actor/director and United Nations Goodwill Ambassador for Biodiversity Edward Norton, and it highlights the dangers of purchasing and transporting illegal wildlife products. WCS's Dr. Heidi Kretser has led a training program with support from the DoD Legacy Program since 2008 to ensure that actions by U.S. military personnel do not violate national, international, and military law or inadvertently harm threatened or endangered wildlife. In places like Afghanistan, military personnel are faced with choices for souvenirs. The training program helps individuals determine what products are legal to transport back to the U.S.—for example, helping staff spot the differences between the furs of globally protected species (illegal) versus furs of non-protected species. The video can be viewed at [www.wcswildlifetrade.org/military](http://www.wcswildlifetrade.org/military).

### INNOVATIVE YOSEMITE BEAR ALARMS

Imagine a device that calls your cell phone before your child gets into something she shouldn't. Well, wildlife managers in Yosemite National Park are using such a device for black bears that are considering getting into things they shouldn't: food and trash of park visitors. From prior human-bear conflict research conducted by WCS's Sean Matthews, many bears near the developed areas of Yosemite were already outfitted with radio collars. Now—with innovation from the National Wildlife Research Center and cooperation from WCS—those collars send a signal to an alarm receiver that then notifies park staff that a bear is approaching the area. This advanced warning helps park staff divert the bear before it can cause property damage, or worse. The alarms have been so successful at reducing conflicts that the Yosemite Conservancy recently funded the refurbishment and purchase of additional devices, bringing the total to 12 alarms for use throughout Yosemite. Staff can now focus on other tasks knowing that if a bear enters a campground or parking lot, they will get a call.



Caitlin Lee-Roney / Yosemite Natl. Park  
Black bear in Yosemite's El Capitan Meadow.



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WCS/J. Larsen Maher

The Wildlife Conservation Society saves wildlife and wild places. We do so through careful science, international conservation, education, and the management of the world's largest system of urban wildlife parks, led by the flagship Bronx Zoo. Together, these activities change attitudes towards nature and help people imagine wildlife and humans living in harmony. WCS is committed to this work because we believe it essential to the integrity of life on Earth.