Steve Shaluta / WV Dept. of Commerce

The West Virginia BLACK BEAR Project

By Chris Ryan

Our largest mammal and our state animal, the black bear (*Ursus americanus*), has fascinated residents, been a staple for hunting recreation and West Virginia's economy, and been an important part of our ecosystems since settlers first set foot in the great chestnut-rich forests of our state. Although the chestnut is long gone from our forests because of the blight, black bear populations have rebounded from an all-time low of fewer than 500 animals in the late 1960s to a healthy population of greater than 10,000 in 2010. This incredible turnaround in West Virginia can be attributed to two major factors: research and protection.

The West Virginia Division of Natural Resources Law Enforcement Section is charged with enforcing state laws with a special emphasis on our wildlife resources. The Natural Resources Police ensure that the laws and regulations established through sound wildlife management and science are followed by everyone in West Virginia. How are these laws and regulations established? The vast majority of natural resources laws have a deep-seated history in wildlife research or monitoring, and the black bear is no exception.

In the early 1970s, the DNR Wildlife Resources Section, led by project leader Joe Rieffenberger, began trapping, collaring and following black bears in West Virginia. Biologists wanted to determine how hunting seasons were affecting the population, identify when bears went to den,

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From left to right, a DNR wildlife biologist prepares the drugs used to tranquilize black bears; a biologist fills a tranquilizer dart; a team of DNR personnel tranquilize a mother black bear; the team weighs the mother bear; cubs are gently returned to the den. Photos by Steve Rotsch

and determine home range sizes of our Mountain State bruins. The early data revealed that black bears go to den in a predictable order, and that by adjusting hunting seasons wildlife biologists could allow the population to grow, but still permit hunters to enjoy the sport that they love.

Since those early days the black bear monitoring and research program has been a staple of DNR's image, but this changed with time to include many different aspects of biology, human dimensions, hunter demographics and success, economic impact analysis, and the retention of telazol (the drug used to tranquilize black bears). While most West Virginians may associate the black bear project with the cute pictures of fuzzy black bear cubs at dens, the other aspects of the project are just as important as monitoring the population.

Black bears are one of the most unique animals in West Virginia because biologists attempt to manage the animals at a cultural carrying capacity. This is the population level that residents desire. Many other wildlife species are managed at a biological carrying capacity, which is essentially what the land can support, or from a compensatory/additive mortality theory, which is basically the number of animals that would have naturally died without hunting. However, because black bears have so few natural predators and do not exhibit a biological carrying capacity in the eastern United States, it is necessary to control the population through the manipulation of hunting seasons. But how and at what level should biologists set management goals?

Determining what residents thought about the black bear population, different hunting methods, and the black bear management program presented a unique and complex human dimensions project for wildlife biologists. To accomplish such a huge task, the DNR contracted Responsive Management, a survey company specializing in natural resources science, to conduct a statewide survey of residents. This included making the phone calls and analyzing the data.

Hunters play an integral role in bear management, helping to control the population and providing valuable statistical data for analysis.
WV DNR photo

Below, a female black bear in her den.
Mark Shock / WV DNR

We found that the majority of West Virginians thought the black bear population was about right in their particular region, but large differences in opinion showed up among regions of the state. More residents in the central mountains region wanted the population reduced as compared to other regions. In addition, while residents had a high approval of black bear hunting with a gun (77 percent), they showed a much lower approval rating for particular methods, such as baiting with a bow (which is illegal) or using dogs to hunt black bears.

Understanding opinions and areas of the state where certain hunting methods may or may not be applicable is crucial to the successful management of our natural resources, but represents only a small piece of the puzzle. Therefore, the Wildlife Resources Section set out to determine who was a typical bear hunter in West Virginia, and how effective they were at controlling the population. The results were eye opening to even some of our veteran biologists.

Nearly 50 percent of hunters who purchased a black bear stamp did so to primarily hunt bruins with archery equipment. Approximately 25 percent of hunters buying the stamp did so to pursue black bears using dogs while the remaining quarter primarily hunted with a gun without the use of dogs. As someone might imagine, hunters using dogs had the highest success rates. They also passed up the most opportunities to harvest black bears. Biologists also discovered that many hunters using dogs participated in the early hunting seasons held in Kanawha, Boone, Fayette and Raleigh counties and would travel great distances to enjoy the sport that they loved. These important data provided evidence for biologists to propose significant changes to not only our hunting season structure but also the bag limits. The fact that one type of hunter may be more effective than another hunter in different situations provided the DNR with many tools to control the bear population.

Black bears have one of the lowest reproductive rates of any land mammal in North America, so understanding the delicate balance of their population dynamics is crucial to the proper management of the species. The DNR black bear project had been tracking reproduction through numerous methods – population reconstruction (back dating or modeling the population), dissecting reproductive tracts from hunter-harvested or road-killed animals, and counting cubs at dens. As part of the long-term analysis of these data we looked to see if there were any differences between the methods and study areas. What we found was very interesting and will end up saving hunters and the DNR valuable time and resources in the future.

We were able to demonstrate that the number of black bear cubs surviving to year one was statistically equal to

The author weighs a black bear cub. Steve Rotsch

what biologists and managers observed in the den. Therefore, if we are able to collect enough teeth from hunter-harvested bears, we can tell how many cubs survived until age one — the crucial factor — without visiting dens. We will continue to collect reproductive tracts in the future so that we can determine the percent of each age class that successfully reproduces; however, this important piece of information will save the DNR money and time. In addition to discovering these important facts, we learned that females in the southern part of the state have cubs one year earlier on average than bears in the mountains. These important facts help wildlife biologists control the population growth rates of black bears. But because it is extremely difficult for the DNR to manipulate reproductive rates, we examined additional parameters that may control black bear populations.

Survival is the one major parameter that the DNR may control using the length and timing of hunting seasons, hunting methods used, and bag limits. During the recently completed study, we used all available data to determine the parameters that would have the largest impact on the population, and how best to track these parameters on a statewide and management unit level. We compared survival data from radio-collared animals, tagged animals that were not radio-collared, survival rates calculated using cohort reconstruction method, and survival rates from a Downing reconstruction model.

Survival data from the radio-collars and tags were higher than both of the reconstruction methods. This relates to the fact that we don't get an adequate sample of teeth because West Virginia does not require mandatory tooth submission. Many other states require hunters to give a small premolar tooth for aging. Their agencies may use these data to save money and propose hunting seasons. One of the best ways a hunter can contribute is to supply that valuable tooth data. Each hunter who supplies a tooth is sent a postcard the following year with the bear's age.

When all of the reproductive and survival analysis was completed, it was time to model the population to determine the population growth rates for our different study areas. The differing survival and reproductive parameters made it necessary to model the populations separately. The northern study area in Randolph, Tucker and eastern Barbour counties had a growth rate of approximately nine percent during the study period. The southern study area, composed of Kanawha, Boone, Fayette and Raleigh counties, also had a growth rate of approximately nine percent before early hunting seasons were initiated. The higher reproduction in the south was basically balanced by a higher female survival in the mountains. However, after the DNR started an early gun hunting season in 2002 on the southern study area, the population stabilized. It was a very interesting finding because some people believed that the population was still increasing while others thought the population had crashed.

What we learned was that the adult female black bears living on actively protected mine company property were rarely harvested, which allowed for a positive population growth. On the other hand, bears living outside of those protected areas had a much lower survival rate and showed a decreasing population trend. However, when you combined

Steve Rotsch

The author determines the cub's sex, as well as estimating its age by measuring hair and ear length.

the two and looked at the larger picture, we demonstrated that the young were likely dispersing out of those protected areas and were keeping the overall population stable. It was a very unique finding of privately owned "refugia" that enable the DNR to have some of the longest hunting seasons in the country.

In addition to modeling the population growth rates, we were interested in determining exactly how the changes in survival may or may not affect the population. We modeled numerous different scenarios and determined that while adult female survival was the crucial parameter controlling the population, it was likely a combination of female survival rates that help to bring our black bear population back in line with management objectives. Our findings demonstrated that by adjusting the season dates, which would impact the female survival rates across different age classes, the DNR may effectively manage the population. However, it is crucial to the biologists and our resources to have the teeth from all hunter harvested bears to model these changes.

Managing the black bear resource for all West Virginia residents has come a long way since that first radio collar was placed on a bear in 1972, but none of it could have been done without the dedication and efforts of so many individuals along the way. From legendary bear biologist Joe Rieffenberger, to the wildlife managers that worked countless hours trapping and tracking bears, to the natural resources police officers on patrol, to the hunters that supplied the funding and data, it has been a total team effort that should make all West Virginians proud. The Black Bear Research and Monitoring Project will face many new challenges in the years to come as it focuses on managing the population and dealing with bears in urban/suburban environments, but it is a challenge that the DNR is looking forward to and will tackle with gusto.

Chris Ryan, Supervisor of Game Management Services, received his Doctoral degree from WVU in 2009. He served as the DNR's black bear project leader from 2003–2009. His dissertation with all of the specific numbers and facts is available on the DNR's website www.wvdnr.gov.