

## National Elk Refuge News – March 8, 2010

### *Results of a Local Study on Lead in Ravens Available*



*A recent study shows that scavengers feeding on carcasses during the hunting season may affect blood lead levels. Photo courtesy of Craighead Beringia South.*

The effects of non-lead ammunition on the Jackson Hole raven population have caught the attention of local hunters, wildlife managers and biologists in the past few weeks as the results of a 2009 Craighead Beringia South study have recently become available.

The non-profit science organization, based in Kelly, Wyoming, began sampling blood in ravens in 2004 to determine if lead levels increased during the hunting season. Fragmented bullets often stay in the discarded remains of harvested game and can be ingested by scavengers. Ravens are a good “indicator species” for monitoring lead levels, a term referring to plants or animals that demonstrate some distinctive aspect of environmental quality. They can be among the most sensitive species in a region, and, like a canary in a coal mine, can act as an early

warning to monitoring biologists. The range of blood lead levels in ravens is smaller than in other area scavenger birds, making it easier for researchers to measure a minor change in lead levels. Whereas a raven’s blood lead level generally ranges from 0 to 60 micrograms per deciliter, an eagle’s tolerance may range from 0 to 700 micrograms per deciliter, making it more difficult to detect a small variation.

Additionally, ravens are very prevalent throughout the Jackson Hole valley, making it possible for researchers to catch enough of them to serve as an adequate sample size for the population. Nesting studies indicate the Greater Yellowstone Ecosystem supports one of the three most dense raven populations in the world. Because ravens remain in the valley year-round, they can be tested both during and outside of

the hunting season, a key factor in this particular study.

Ravens feed primarily on carrion, or rotten flesh, in the fall. They prefer carcass entrails over large pieces of flesh because it’s more typical of their other food sources and easier to feed upon. Gut piles are common throughout the fall when hunters are harvesting a number of game species. Widely recognized as highly intelligent birds, ravens have been observed responding to the sound of rifle shots in the fall, an example of classical conditioning reinforced during the hunting season.

To catch birds for testing, Craighead Beringia South biologists set out net launchers and bait under the cover of darkness. They have observed that ravens won’t begin feeding on the bait for at least a week or longer, requiring

*Craighead Beringia  
South biologists  
Bryan Bedrosian  
and Ross Crandall  
release ravens  
captured for testing.  
Photo courtesy of  
Dan Varland.*



it be covered each night with a tarp to keep other scavengers off. “Ravens are incredibly smart, and with that comes a hesitancy to feed upon a food source that seems suspicious or out of place,” explains Bryan Bedrosian, who heads up the organization’s avian projects. When the ravens finally come to the bait, they are ensnared in a net, which is activated by a remote detonator that can be set off from as far as a half-mile away.

To draw the birds in sooner after the bait is set, the biologists will often stage a mock hunt, going through the steps that simulate harvesting an animal. The avian crew will take a road-killed animal to the site, walk back to the vehicle, dress in florescent orange clothing, and shoot off a net launcher or other explosive device to imitate a gunshot. They walk back to the carcass to gut the animal and drag it back to the vehicle, leaving the gut pile behind. “When we do that, there isn’t a week or two lag

before the ravens start feeding on the remains. Rather, they’ll be on it that same day,” Bedrosian said. “It’s an extra step we have to take because they’re so intelligent.”

In 2004, the first year blood lead levels during the hunting season were compared to non-hunting periods, Bedrosian noted that spikes in lead levels were apparent even after the first week. By early December of that year, 50% of all the birds tested showed higher lead levels than the pre-hunt sample population. When evaluated again after rifle hunting had ended for the year, none of the tested ravens showed elevated blood lead levels. Though lead traces can leave the blood relatively quickly after exposure, they can accumulate in organs over time, an impact not measured in this study.

Results from 2004 – 2008 were very consistent, showing that average lead levels for those years were directly related to the number

of animals taken in Grand Teton National Park and the National Elk Refuge, where numbers of harvested animals are tracked. Median blood lead levels rose from approximately 2 micrograms per deciliter to 10 during the hunting season, or five times the average amount of blood lead levels. Blood lead levels of 10 micrograms per deciliter can serve as a trigger point for concern, representing a level reaching a toxicity threshold that could start affecting an animal’s survival.

This past fall, Craighead Beringia South implemented a large educational push for the use of non-lead ammunition. With logistical support from the National Elk Refuge and Grand Teton National Park and financial support from *1% for the Tetons* and other donors, the non-profit organization was able to purchase and distribute 194 boxes of lead-free rifle ammunition to people hunting within the two Federal

*Bedrosian conducts tests to sample blood lead levels.*

*Photo copyright: Greg Winston*



jurisdictions. Both Grand Teton National Park and the National Elk Refuge provided literature to all persons who obtained a hunting permit, encouraging them to voluntarily use and report non-lead use. The program's goal was to educate hunters on the positive effects of using lead-free ammunition while giving them an opportunity to work with Federal and non-profit cooperators in the wildlife study.

According to information submitted by hunters on printed harvest reports this past fall, 24% of all successful elk hunters taking part in elk reduction programs in Grand Teton National Park and the National Elk Refuge used non-lead ammunition. The National Elk Refuge requires all elk hunters to turn in a hunting report, whether or not they are successful; 33.6% of all respondents reported non-lead use, indicating hunters may have voluntarily supported the program through their own purchases of non-lead ammunition.

Previous results showed that as more carrion was available for scavengers because of increased hunter success, the blood lead levels in ravens increased. Based upon the number of elk harvested this season, researchers predicted blood lead levels of 14.3, but instead measured levels at 10.3. The 28% decrease from the predicted level based on harvest rates supports the hypothesis that the number of hunters using lead-free ammunition had a substantial positive impact on raven lead ingestion this year.

“It's only the first year's findings after implementing an educational campaign and seeing a decrease in lead ammunition use,” National Elk Refuge Manager Steve Kallin said, “but it seems to show some pretty tangible results. We're encouraged by the findings and the apparent support by hunters who are voluntarily purchasing their own non-lead ammunition.”

Since the beginning of the study, Craighead Beringia South biologists have captured and tested

601 ravens and will continue the study in Fall 2010.

Craighead Beringia South's report entitled “Removing Lead from Our Wildlife and Wildlands – 2009 Interim Report” summarizing their findings from this study can be found on the National Elk Refuge's web page at [www.fws.gov/nationalelkrefuge/Documents/CBS\\_09\\_Lead\\_Results.pdf](http://www.fws.gov/nationalelkrefuge/Documents/CBS_09_Lead_Results.pdf). For additional information, visit Craighead Beringia South's web page at [www.beringiasouth.org](http://www.beringiasouth.org).



*Blood samples from captured ravens are lined up in the laboratory.*