



Courtesy Jim Nelson



MANAGING BEAR-HUMAN CONFLICTS

A PROCEDURAL MANUAL FOR PERSONNEL OF THE
NEVADA DEPARTMENT OF WILDLIFE



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INDEX

INTRODUCTION	2
SECTION 1 - BEAR BEHAVIOR AND AVOIDING CONFLICT	3
UNDERSTANDING BEARS	3
TYPES OF ENCOUNTERS	5
HOW TO ACT DURING AN ENCOUNTER	6
SECTION 2 – CAPTURING & IMMOBILIZING BEARS; TRAP SAFETY	7
CAPTURING & IMMOBILIZING BEARS	7
TRAP SAFETY	9
CAPTURED BEARS	10
RELEASING BEARS	11
SECTION 3 - PROCESSING BEARS AND PROCESSING PROCEDURES	11
PROCESSING BEARS	11
PROCESSING PROCEDURES	12
CONCLUSION	15
APPENDIX	16
GRAPH – CORRELATION OF CHEST GIRTH TO WEIGHT	22
ESTIMATING AGE USING TOOTH WEAR	23
DIAGRAM - BEAR PAW MEASUREMENTS	26
TELAZOL CHEAT SHEET	27
IMMOBILIZATION FORM	28
BONE COMPARISON – HUMAN HAND & BEAR PAW	29
COUNTY VIOLATIONS – CONTACT PHONE NUMBERS	34

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The use of this manual is intended as a reference guide for NDOW personnel involved in managing black bear-human conflicts. These situations can often be high profile and even volatile in nature. The instruction contained herein will promote professionalism and consistency in handling conflict situations. This manual should serve as a guideline only, and does not preclude common sense, nor is it intended as a capture manual or chemical immobilization guidebook as these topics deserve their own discussion. All NDOW field personnel in the Game and Law Enforcement bureaus should be familiar with the *Wildlife Capture Manual* and should have attended a formal NDOW immobilization training course.



Reference Sources:

Photo courtesy – unknown Glenbrook resident

- NDOW Policies: *Black Bear Conflict Management (2007)*; *Human-Wildlife Conflicts (2008)*; *Movement and Disposition of Terrestrial Wildlife (2008)*; *NDOW Prescription Drug Policy (2008)*; and *Wildlife Depredation (1987)*.
- *Wildlife Capture Manual (2007)*, Nevada Department of Wildlife.
- *Staying Safe in Bear Country, A Behavioral Approach to Reducing Risk (video)*. Magic Lantern Communications, Toronto, Canada. Available at www.bearbiology.com/iba/safety-in-bear-country.
- *Managing Bear Conflict* – Washington Department of Fish and Wildlife.

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INTRODUCTION

“Nevada has no bear, except for an occasional one that strays in along the Sierra’s adjacent to Lake Tahoe in California. Therefore we have no management responsibilities.”

The above is a quote by Glen K. Griffith, past Director of the *Nevada Department of Fish and Game*, and is from the *First Western Black Bear Workshop* proceedings (Arizona-1979). These two sentences made up the entire Nevada Black Bear Status Report presented at the workshop. 30 years later Nevada hosted the 10th Western Black Bear Workshop and we have one of the most high profile bear populations in the country due in part to the type of research conducted in the state and the appeal of the Reno/Lake Tahoe area as a tourist attraction.

More bears or more people? - So what has changed? It is safe to say that both the bear population and the human population in Nevada have increased, especially in western Nevada along the eastern face of the Sierra Nevada Mountains. We know that black bears have always been native to Nevada, based on numerous historical records. These newspaper articles and accounts from pioneer diaries indicate that black bears (and in some cases grizzlies) were once distributed throughout several Nevada mountain ranges, including; the Jarbidge, Ruby, Toiyabe, Pinenut and Wassuk mountain ranges, and Carson Front of the Sierra Nevada. Following pioneer settlement and the mining booms of the 1800’s bear complaints and sightings seem to have diminished during the 1900’s, up until about 1987. From that point to the present bear complaints have steadily increased. Research conducted by NDOW, the University of Nevada, Reno and the Wildlife Conservation Society (WCS) from 1987 through present day has revealed much about bear distribution and population densities in Nevada. We believe that, to a certain extent, bear populations have not increased proportionately to bear complaints, which in turn have increased disproportionately to the human population. There are a couple of hypotheses to explain this: 1) a change in the distribution of bears in response to an increase in the availability of anthropogenic foods; 2) bears expanding back into historic habitat following landscape scale habitat changes.

Resource distribution - We concluded in a 2003 publication in the journal of *Zoology* that the bear population had redistributed itself across the landscape in response to anthropogenic food sources; meaning there were more bears at the urban-wildland interface than ever before, and those bears probably came from the wildland areas or from California. At the time of that publication we documented having the second highest reported density of black bears in North America, and this was in the populated areas of the Tahoe Basin on the Nevada side, including Incline Village, Glenbrook and Stateline. That data was collected over a period of about five years, 1997-2001. This is a relatively short time frame when investigating demographics of a large carnivore such as black bears, and ecological systems change which means it can be very valuable to monitor these populations over the long term. Long term data sets give us a longer time frame, allowing us a look through a much larger window if you will, at the bear population. Data collected from 1997-2008 for example clearly indicates an increase in the bear population, and this population is responding to a clumped food resource (trash).

Landscape scale habitat changes – To explain why bears were fairly well distributed across Nevada in the 1800’s and then vanished by the 1900’s, only to begin reappearing in the 1980’s, one should consider the time frame and what events occurred that could have resulted in the extirpation of bears in Nevada. The Comstock Lead and other mining booms of the 1800’s resulted in the removal of Pinion-Juniper woodlands in the interior of the state, and the removal of virtually all the coniferous

forests in the Carson Range/Lake Tahoe Basin. Black bears are a forest carnivore and the removal of this critical habitat on a landscape scale could have resulted in the extirpation of black bears from most of the state. This would make sense because immigration from interior California as well as from other areas in the Sierra Nevada would have resulted in the persistence of bears in the extreme western portions of Nevada including the Tahoe Basin, even if at somewhat lower densities. After the mining booms and throughout the 1900's land management practices allowed for expansion of Pinion-Juniper woodlands and protection of coniferous forests. This, combined with management protection of bears in California and Nevada, resulted in expanding bear populations. These populations would have slowly filtered back into historic habitat following maturation of the revived forests. The threshold between growing bear and human populations may have been reached in the 1980's when NDOW started receiving more complaints. An event such as the drought of the late 1980's acted as a catalyst by bringing more bears into the urban interface in a very short period of time. Today we are dealing with more bears in the population, with an increasing number of these bears utilizing urban environments. A result of both hypotheses.

Bear populations have expanded far enough that presently we regularly receive complaints from points further east into Nevada, such as the Pinenuts, Virginia Range and the East Walker River/Yerington area. In the last 10-15 years we have documented sightings in much of the historic habitat – places like Jarbidge, Wells, Caliente, Vya, Tonopah and Hawthorne. Myths abound to explain this, including the rumor that we are continually translocating bears into these areas, or that Yosemite National Park has brought their problem bears to Nevada. Neither is true. When discussing conflicts with the public try to point out the fallacies with such myths and explain that the increase in local bears and bear complaints is a result of both expanding bear populations, and increasing human populations into forested habitats, resulting in the ever-adaptable black bear taking advantage of carelessly stored human foods.

SECTION 1 - BEAR BEHAVIOR AND AVOIDING CONFLICT

UNDERSTANDING BEARS

NDOW personnel responding to bear conflicts should be familiar with different bear behaviors and understand their complexities. Being able to do this will not only ensure your safety as well as that of others, but it is just as important to be able to deliver a clear and consistent message to the public. These messages must be well thought out and based on science and sound management principles. Below are some of the more important messages to relay to the public, including *Types of Encounters* and *How to Act During an Encounter*.

- The safest way to reduce risk during a bear encounter is to understand as much as possible about bear behavior and motivation, and be able to respond properly. The notion that bears are unpredictable closes the door to a better understanding of bears and denies a great deal of consistent behavior that we can usually interpret.
- All bears exhibit similar body language clues that you can read to decipher their dispositions and possible intentions. Particularly important are signs of stress which can be the prime motivation behind many charges or attacks. You may notice one or several of these behaviors, singularly or together, depending on the individual bear and its' prior experience with humans.
 - ✓ Light stress – pause in activity, stiffen in stance or change in orientation, a yawn that seems out of place.

- ✓ Moderate stress – huffing or moaning, popping of teeth, head swinging back and forth.
 - ✓ High stress – rapid, vocal huffing, open mouthed “jawing”, guttural noises that are almost like growling, swatting the ground with their paw, and charging with or without physical contact.
- Do everything you can to avoid encounters in the first place. This usually means removal of all attractants around the home, such as trash, pet food and bird feeders.
 - Human-habituated bears – are bears that because of repeated or prolonged exposure to humans have lost the natural wariness of people and will learn to tolerate people at closer distances.
 - Human-food-conditioned bears – are bears that have learned to associate people and human development with a food reward. These bears may aggressively seek human foods by breaking into garages or homes. *Bears may be habituated, food-conditioned, or both.*
 - Bears in general will go out of their way to avoid a physical confrontation. For black bears, which are the only species currently in Nevada, retreat is their usual option. Black bears evolved as a forest animal where escape cover was typically close by, and this is why a black bear will usually flee or climb a tree when it feels threatened. This is also the reason you shouldn't haze or harass a black bear that is up a tree; you are teaching it that a tree is not a safe place which is contradictory to its' instinct.
 - Stay alert and aware of your surroundings when in bear country, and try not to surprise a bear. Warn them of your presence by making noise as you travel, especially in thick cover. Choose campsites carefully, well away from bear trails, food sources such as shrubs with berries, and areas known to have bears. Keep a clean camp, free of assessable attractants such as food, garbage and unwashed dishes or cookware. Never take food or toiletries into tents, and remember to change the cloths that you cooked in before going to bed.
 - All but a fraction of bear/human conflicts end peacefully. These figures may be tempered somewhat by the fact that the chances of having an encounter may actually be higher today than it was in past decades but the statistics are still valid.
 - People tend to overestimate the size of a bear, especially if they saw it during some sort of close encounter. An easy method to determine general size is to look at the ears. The ears on black bears are all about 5” long once they reach dispersal age (1+). If the ears appear large, as in the photo on the left (Figure 1 below), you're dealing with a small bear. If the ears resemble stubs on the side of the bears head, you're facing a larger bear.
 - Bears are very intelligent and are accomplished problem solvers. Use bear-resistant food containers when living or traveling in bear country. Don't learn the hard way as thousands of others have had to do before you! **If you wait until you have a conflict you have waited too long!**



Figure 1 - Example of ear size relative to body size. *Photos courtesy of Tony Robinson and Gay Bickett - Lake Tahoe*

- It is normal for bears in a natural (wild) situation to be actively feeding during the day, especially just after den emergence and just prior to entering their den. Reverting to night-time active behavior is more often seen with conflict bears that are taking advantage of human foods but attempting to avoid humans at the same time.
- Day-time active bears in conflict situations should be monitored closely to see if their behavior becomes bolder.
- Translocation, often referred to as Relocation, is not a tool managers normally use for a number of reasons:
 - ✓ It is rarely successful. Most bears will return, regardless of how far they are moved.
 - ✓ It doesn't solve the problem. The attractants must be permanently removed.
 - ✓ It is logistically expensive (time and gas).
 - ✓ It can create issues with the bear population demographics in the release area, i.e. competition, infanticide, resource selection and dispersal.
 - ✓ It further reinforces people's attitudes that the bear is the root of the problem and they don't need to remove attractants because you have removed "the bear."
- You are not there to remove a problem that was created by improper garbage storage. Residents must accept some responsibilities when living in rural and wild type areas.

TYPES OF BEAR ENCOUNTERS

It is important to first state a clear definition of an encounter. A bear sighting by itself is NOT an encounter, regardless of the person's heightened level of anxiety. An encounter can be defined as: a situation in which the presence of one or more people causes a change in the behavior (response) of the bear. If you encounter a bear on a trail, or if one approaches you, knowing the difference between the "defensive" and "non-defensive" behavior of the bear is key to your response and can affect the outcome of the situation. Remember, most bears will avoid you if possible, but when they don't there are reasons why, and these can usually be grouped into two categories.

- Defensive encounters – are encounters where the bear may feel threatened by your presence. This could be due to your proximity to the bear, or possibly you surprised it or made it feel crowded. A defensive bear may be protecting young or food as well. Such a

bear will appear agitated and show obvious signs of stress (see above-*Understanding Bears*).

- Non-defensive encounters – may occur for several different reasons. The bear may be curious; its approach slow and hesitant with ears and head raised as it sniffs the air. It may be human-habituated and appear unconcerned with normal human activities. These bears may be bold and deliberate, and hard to dissuade. Sometimes a bold bear will approach a human to test its dominance.
 - ✓ Predatory encounter – is a type of non-defensive encounter where a bear views a person as a potential meal. Predatory bears can be very persistent and focused. There is some data to indicate these are typically wild bears with little or no previous human contact. This type of encounter is extremely rare and may never be observed, but it is discussed later nonetheless.

HOW TO ACT DURING AN ENCOUNTER

This is probably the question most often asked of NDOW personnel. It is very important that a clear and consistent message be given. While there is no uniform response that will be successful 100% of the time, the suggestions below are derived from the best available science and literature concerning black bear encounters.

- If you see a bear, stop, remain calm and assess the situation. If it appears to be unaware of you, move away quietly when it's not looking in your direction. Continue to observe the bear as you retreat while watching for changes in its behavior.
- Never intentionally approach a black bear as your proximity may invoke an aggressive response. If the bear is already aware of your presence and you want it to leave (such as a bear in your open garage) you can try talking firmly to the bear and making noise, such as clapping your hands or stomping your feet.
- Black bears can see and hear probably as well as most humans, but they depend on their nose in most cases to warn them of danger. For this reason some bears may not react to your presence simply because they have not recognized you as a human. They may see movement or hear a sound and then stand on their hind legs in an attempt to sniff the air for your scent. Standing on their hind legs is NOT a sign of aggression.
- Often, a bear will move away when it realizes you are a human. It's best to leave the area yourself but if you have to move in the direction of the bear do so at a very safe distance, remaining alert and cautious. If the bear was aware of your presence then making noise will help the bear know your location, avoiding a surprise encounter.
- If you see or hear bear vocalizations, or if you suspect cubs are present, leave the area immediately, retreating the same way you came. Protection of her cubs is serious business to a mother bear.
- If you are with another person or in a group, stand together and present a more intimidating front. Keep small children from running around.
- Bear pepper spray, made specifically for bear encounters, has shown to be an effective way to deter bears.

- A bear that intentionally approaches you is an indication of a potentially more serious encounter. Stop, stay calm and assess the situation. Is the bear acting defensively? Don't run unless you are absolutely certain you can reach safety, knowing black bears can run up to 35 miles per hour. What you do next depends on whether the bear is acting defensively or non-defensively.
 - ✓ Remember, a defensive bear is stressed and your goal is to reduce that stress by appearing non-threatening. Talk in a low but firm voice, back away if the bear is not currently moving in your direction, and do not throw things at the bear. Increasing your separation from the bear is the best way to resolve this situation.
 - ✓ If a defensive bear charges, stand your ground. Most charges are bluff charges and the bear will stop short of making contact. Use pepper spray if you have it.
 - ✓ A non-defensive bear approaches deliberately, showing no sign of stress. Such a bear is curious, habituated, food-conditioned, asserting dominance, or in rare occasions, predatory.
 - ✓ With a non-defensive bear you should stop, remain calm and face the bear. Talk in a firm voice while moving away from the animal. Give the bear an escape route by moving off the trail, uphill if possible. This may be all the animal wants. If the bear follows with its attention directed at you, stop and stand your ground. At this point all but an aggressive or predatory bear will stop or move away.
 - ✓ If a bear enters a tent or building it should be considered non-defensive and a potential threat. Shout, wave your arms and clap your hands. If the bear is intent on food in the building and is ignoring you, then retreat to a safe place and call authorities.
 - ✓ **Predatory bear** - Any bear that continues to approach is a serious threat. At this point you should act aggressively, letting the bear know that you will fight if attacked. Clapping your hands loudly is effective with black bears, however the more it persists the more aggressive your response should be. Shout, stamp your feet, look the animal in the eyes, and take a step or two toward the bear. If the bear attacks – fight back by kicking and punching the bear and gouging its' eyes. In essence you are fighting for your life.

As an NDOW employee you should as a minimum always direct people to our web sites bear page and tell them to download the brochure *LIVING IN BEAR COUNTRY?*

SECTION 2 – CAPTURING & IMMOBILIZING BEARS; TRAP SAFETY

CAPTURING & IMMOBILIZING BEARS

Trapping a bear to solve a conflict situation should only occur under certain circumstances. In almost all cases of bear-human conflicts, emphasis should be placed on removing all attractants rather than removing the bear(s). Indeed, there are plenty of situations where NDOW personnel will need to trap or immobilize a bear, but there are also situations and reasons when there is no need to capture the animal. Keep in mind that once you capture the bear then the real work begins; immobilizing the bear, processing it with identification tags, taking biological samples, and then deciding on the most appropriate location for release, which usually has to be done the next day, after the bear recovers. If the attractants have not been removed then moving the bear will prove to be a temporary solution at best. Bears that are relocated, even considerable distances will almost always return to the capture site. This is the main reason for the use of on-site releases, which

usually means in the immediate vicinity of the capture. Release locations will be discussed later. See the Appendix section for some example scenarios to aid in your decision making.

There are some general guidelines to consider whenever you are faced with any type of capture, whether it is a free-range capture or a trapped bear.

- In a free-range capture situation it is very important to keep the bear from getting excited, at least to the extent possible. If in route to a call and you have contact with the dispatch for the public safety officers that are responding, have them stay as far away from the animal as possible while maintaining a visual. When you arrive, take control of the situation by asking the officers to help keep the general public away. By removing everyone from the general area you will avoid stressing the animal any further.
- Try not to “push” the bear unless you want it to go a certain direction, such as up a tree. Once in a tree, stay just close enough to keep the bear where it’s at. By moving closer or standing under the tree you will invariably cause the bear to climb higher, which may be good or bad depending on what you are going to do next. For example, you may want to dart the bear and then back off a slight distance to allow the bear to come down the tree before induction takes place. (*Appendix – Figure 1*)
- If at all possible, stay out of sight when darting the bear. Once darted, you should move away or out of sight; again, trying to maintain a visual without further stressing the bear. Often times even though the bear has been darted it will quit running, or climbing higher, if you just back off.
- Make sure you are comfortable with the immobilizing equipment and drugs. Arriving at a situation where the public and media are present is not the time to be trying to remember proper dosages or how to mix a drug cocktail. Be sure you are using the right dart and size of needle for the animal. At least with bears, generally speaking you will use a shorter needle in the spring time than you would in the fall.
- Front shoulder dart placement is the preferred site for bears because of the potential for a heavy fat layer in the hindquarters. If you inject drugs into the fat layer it may take 3-4 times as long for induction to take place. This is because the immobilization drugs are *lipophilic*, meaning they affect the lipids in the brain; so when they are injected into a fatty layer (lipids) and not muscle they are absorbed at a much slower rate. The lack of blood flow in the fat layers also attributes to this. The result is a bear that takes much longer to immobilize and longer to recover. For example, a fall bear darted in the hindquarters may take an hour or more to become immobilized and five or six hours to recover.
- If you are faced with capturing multiple bears, i.e. a sow with cubs there are a few things to be aware of. It is usually easier to immobilize the sow first and then the cubs as they will generally stay in the vicinity to be with their mother. Placing the immobilized mother bear outside of the trap or at the base of a tree (if the cubs have climbed the tree) is one way to bring the cubs to you for ease of darting. Tossing a few marshmallows around the tree or the sow is one way to coax the cubs into slowing down and shift their attention away from you. Obviously much smaller darts with short needles are used for most cub immobilizations. If possible, use a blow-gun rather than a dart rifle. Once immobilized it is best to quickly check that each bear has an open airway, then ear tag each bear before

processing the bears any further. This will help assure proper identification of samples and data (see Section 3 below).

- Any bear that is determined to be a public safety threat, as determined by its' behavior, should be captured as soon as possible and euthanized per NDOW policy.

Per policy, NDOW field personnel are allowed a lot of discretion when responding to a bear-human conflict complaint, as they should. Every call is different and no one solution fits every situation. Houndsmen with trained dogs are a tool that you have the ability to call upon. Per policy, you may contact either the USDA-Wildlife Services or a private houndsman. Regardless of who you call, you will want experienced hound handlers with capable bear hounds. They are in a sense acting as "agents of the state". Pick handlers that you are certain you can trust to remove or harass the animal in an ethical and professional manner. Keep their phone numbers handy as you may need to call upon them late at night or under stressful conditions. *See the example scenarios in the Appendix section.*

TRAP SAFETY

If you've made the decision to trap the animal then a culvert trap is the preferred method. Culvert traps have evolved over the years from a simple steel culvert pipe to sophisticated aluminum transport systems. As with other management tools there are many positive and negative aspects to using culvert traps that the user should be cognizant of.

- Advantages
 - ✓ Animals can be easily transported and released.
 - ✓ With proper use they are safe to animals and people.
 - ✓ When a bear is captured there is no rush to immobilize it.
 - ✓ Personnel can release non-target animals such as bobcats, raccoons and domestic dogs.
- Disadvantages
 - ✓ Culvert traps are heavy and bulky, which may limit trap site availability.
 - ✓ Culvert trap doors can cause injury to animals and people.
 - ✓ Bear claws and teeth may be broken or damaged.
 - ✓ Size of captured animal may be difficult to determine, affecting proper drug dosage.

When using a culvert trap spend some time scouting for the best trap location. Bears are creatures of habit and tend to use well known trail systems and established points of entry. If you locate such a trail and place the trap as close by as possible, your odds of a capture will increase markedly. Other factors must be taken into consideration as well when placing a trap:

- Can the trap be set on somewhat level ground and can it be secured using the trap's stabilizers and wheel chocks? Unstable traps will be less likely to catch a bear since it will increase the bear's wariness. Also, bears will likely rock the trap once captured which poses the threat of an unstable trap moving or rolling.
- Is there shade for the animal should a capture be made?
- Have residents in the area been notified to keep pets and children away, especially once a bear has been caught?

- Have you informed NDOW dispatch of the trap location? Notifying local law enforcement as well is a professional courtesy and they can check it for you on routine patrol.
- Are you using effective bait? Rotten fruit, pastry products and fish are all effective baits. Bears follow their nose so try to use odiferous products as well like liquid smoke or warm bacon grease. Most of your clients will be more than willing to touch up the bait for you if asked.
- In hot weather be sure to use baits with high oil content so they don't dry out or lose their scent. Sardines work well.
- DO NOT OVER BAIT! It does not take a lot to capture a bear. Too much food may affect the time it takes for induction once a bear is given immobilizing drugs. About two cans of sardines or six donuts scattered around the bottom of the trap and a few inside the bait bag or bucket is all that is needed.



Figure 2 - Notice in above photo that the trap is set in the shade, with stabilizer jacks extended, the rope is hanging freely and the trap is properly signed. In the photo at right notice that the trap is clean, the bucket is hung high enough to insure a bear must pull on it to get to the bait inside, and the proper amount of bait is being used.



- When hanging the bait bag or bucket in the trap avoid using wire if possible, or at least use the minimum amount required. Wire may be pulled down by the bear causing injuries to the mouth or eyes. Zip-ties are a good alternative.
- Be sure the proper signage is affixed to the traps warning people to stay away.
- Trap maintenance is very important. Captured bears will urinate/defecate in the traps, and most baits will rot over time. Minimize the spread of disease by thoroughly cleaning the trap after use. This will also insure the traps maintain a professional look, as you never know when your next capture will be on TV.

CAPTURED BEARS

Once you have captured a bear the first thing you should do is assess the security of the trap. Are there any other bears in the vicinity, i.e. have you captured cubs and the sow is still nearby? If so,

and you cannot capture the remaining bears then you should consider releasing on-site. Has the door fallen completely and is it shut tightly? Once you have assured all of the above you can then proceed with transporting the bear. If the captured bear is not a candidate for release, follow the protocols for euthanasia and disposal of the carcass. If the captured bear is a candidate for release you should be prepared to tranquilize the animal and process it completely. Once this has been accomplished the bear should be allowed to recover in a safe, quiet place away from onlookers, until the drugs completely wear off, usually overnight.

RELEASING BEARS

When releasing the bear(s) refer to the policy *Bear Conflict Management* for information on choosing a release site location. Remember, NDOW has not used relocation on a regular basis since 1997. The use of on-site releases has been tested by NDOW as well as other bear managers and the results indicate a higher level of success in deterring unwanted behavior. Whenever possible, the bear should be released as close to the point of capture as possible, taking into consideration such things as:

- Road density, urbanization, people recreating (bikes, hikers), time of day, weather, number of bears you are releasing (single or sow with cubs?).
- What is the bear's level of habituation? If it has been caught before in the same situation then you could consider relocation to an area where its behavior will not impact other communities, knowing that this may not be successful. If the bear is a chronic nuisance then you should reevaluate releasing the bear at all.
- Your level of expertise or experience in releasing bears and using Aversive Conditioning (AC) techniques. Your comfort level doing a release, or the presence of the media or onlookers will also determine the release site. If you are uncomfortable with doing a release you should at a minimum ask for assistance.
- If possible, all bears should be exposed to Aversive Conditioning upon release. AC actually begins with the capturing, immobilizing and handling of the bear – all of which are more than likely perceived by the bear as negative experiences. This can be reinforced by using AC during the release. This should include shooting the bear with non-lethal rubber shotgun rounds combined with loud noises (yelling, sirens and horns), and trained bear dogs if available.

SECTION 3 - PROCESSING BEARS AND PROCESSING PROCEDURES

PROCESSING BEARS

Processing a bear includes everything from recording basic biological data on a road-killed bear to tagging/tattooing and taking samples from bears prior to release. As a minimum you should record the sex, estimated weight (*page 22 in Appendix section*) and estimated age (*page 23 in Appendix section*) of each bear handled. There are several important reasons why we process every bear we handle, including:

- Data - The importance of data cannot be over estimated. When you have an animal in hand you should record everything possible, including sex, age, physical condition, location and abnormalities. Data justifies management actions, in and out of court.

- Having a biological record of animals in the state is very useful for current and future management decisions.
- Future research projects benefit greatly from long-term data sets. Samples you take now may be used several years down the road.
- Processing helps to identify chronic nuisance animals by tagging and tattooing with unique ID numbers.
- Taking of biological samples may help in identifying certain animals in the future; for example a suspected bear in an attack or another serious bear/human conflict situation.

Processing a bear can be time consuming, especially if you have not done it often enough to be comfortable with the procedures. Familiarizing yourself with immobilization techniques is the most important step you can take. This will insure proper induction of the drugs as well as safety for you and the animal. Once the bear is safely immobilized the rest of the processing procedure is fairly simple. Prior to beginning, make sure you have all the necessary equipment and forms handy so that you may completely process the animal prior to it recovering from the drugs. Pay attention to ambient temperatures, and be prepared to keep the bear cool or warm accordingly. Keep the bear on the side of the trap, or if on the ground, place a tarp under the animal. Use a face shroud and hobbles to keep the bear calm and secure. Planning ahead will reduce the chances of having a crisis later. Referencing the *Wildlife Capture Manual* if needed, the procedural steps to take once the bear is immobilized and secured are as follows:

PROCESSING PROCEDURES

Be sure to record all information as you proceed. If the bear is in a trap there is usually no hurry so have everything you will need ready to go before you immobilize the bear.

Safety

- Insure that you are in a safe environment, for yourself and the bear. Maintain a quiet work area as auditory stimuli may reduce the effects of the anesthesia.
- Think about whether you will be pulling the bear out of the trap, i.e. how big is the bear? You may consider darting the bear, then getting him to turn toward the door just before induction takes place. This puts his head where you can get to it and you won't have to pull him all the way out.
- Once anesthetized immediately insure the bear has an open airway; lay the bear on its stomach, (sternal recumbency) or on its side, (lateral recumbency). Do not place bears on their back!
- Bears lose the ability to blink while anesthetized so apply ophthalmic ointment to the bears' eyes to avoid drying them out. The easiest way to do this is by lifting the eyelid up and squirting a small amount of ointment under the lid, then closing the eye. (*Appendix – Figure 4*)
- Cover the bear's eyes with a face shroud or towel to avoid unnecessary stress and attach hobbles to the bear's feet for safety. (*Appendix – Figure 5*)

Physical Characteristics

- Record the sex, and approximate age and weight of each bear. Note any physical abnormalities (missing claws, broken teeth, distinct color markings, etc).

Monitoring Vitals

- Referred to as TPR's, which stands for Temperature, Pulse & Respirations, the vitals should be recorded to ensure the drugs are not having an undesirable effect. .
- As a minimum these should be taken a couple of times over the course of the procedure. Normal ranges for tranquilized bears are:
 - ✓ Temperature of 97°-102° F. Temperatures outside of this range could indicate a problem. Be prepared to warm the bear as needed, or to hose the bear down with water if it is a very hot day.
 - ✓ Pulse per minute of 60+ for larger bears, 90+ for cubs.
 - ✓ Respirations should be above 10 breaths per minute. 12-14 is average for larger bears. Cubs are generally higher, around 20+.
- If any of the vitals are abbreviated try stimulating the bear with noises and vigorous shaking.

Identification

- Ear tag – affixing an ear tag should be one of your first steps. This will assure identification of the animal, even if you are unable to complete anything else. (*Appendix – Figure 11*)
 - ✓ Tag should be placed so the number faces the front.
 - ✓ Affix the tag a little off-center and about two-thirds up from the base of the ear. This will avoid hitting the ear's artery.
 - ✓ The ear tag and tattoo numbers should be identical and should be placed on the same side (right or left) of the bear.
- Tattoo – place on same side of the bear as the ear tag. Tattoos are applied to the inside of the upper cheek. (*Appendix – Figures 6 through 10*).
 - ✓ Apply alcohol to area.
 - ✓ Apply a generous amount of ink in an area slightly larger than what will be covered by the numbers.
 - ✓ Press the numbers into the inked area, squeezing the pliers firmly to make sure that ink is pressed below the skin. Separate the cheek from the needles and inspect the tattoo.
 - ✓ Wipe away any excess ink with a sterile gauze pad moistened with alcohol.
 - ✓ If you are tattooing more than one number, or a number with a letter, you may do it in two steps if necessary.

Note: Ink color used on Nevada bears has varied over the years. Green ink was used on all green ear-tagged bears and red ink was used on all red ear-tagged bears. Since that time black ink has been used for all tattoos, mainly because of ink availability.

- PIT tag – PIT stands for *Passive Integrated Transponder*. Also known as “microchips”, these tags are a way of permanently marking the bear by using *Radio Frequency Identification* technology. Each tag comes enclosed in a pre-loaded, sterile application. (*Appendix – Figures 12 & 13*)
 - ✓ Inject the tag using the implant gun.

- ✓ PIT tag should be place subcutaneously (between the hide and muscle structure).
- ✓ Implant the tag along the sagittal crest, in between the ears.
- ✓ Seal the hole immediately with super glue to prevent the tag from migrating back out of the implant hole.
- ✓ The PIT tags come with several adhesive identification tags. One of these MUST be affixed to the capture form.
- ✓ PIT tags can migrate considerably. When scanning an animal for a previously implanted tag be sure to scan the head, back and down the shoulders.

Biological Samples

- When taking samples avoid contamination and cross sampling by wearing exam gloves and completing each bear separately. Label each sample with the: Date, Sex and ID number of the bear.
- Hair samples are used for DNA and isotope analysis.
 - ✓ Pull hair rather than cutting it to ensure you get samples of the hair root. Place hair sample in a small envelope and label it accordingly.
- Blood samples are used to answer various questions related to disease. They may also be used for DNA analysis.
 - ✓ Draw blood from the carotid or femoral arteries. (*Appendix – Figure 14*)
 - ✓ Attempt to draw 8-10cc, placing 3-4cc in one each tiger-top and purple top blood tubes. DO NOT force the blood from the withdrawal syringe into the blood tubes. The tubes are designed with a vacuum so they should fill automatically. Label accordingly.
 - ✓ If available, place a few drops on an FTA card and a few drops on a Nobuto strip (place the Nobuto strip in a small envelope) and label accordingly.
- Tooth samples are used to age the bear (beyond field estimation).
 - ✓ Only perform the procedure on a live bear IF you have been properly trained and you have the appropriate equipment. (*Appendix – Figures 15-17*)
 - ✓ One of the first upper pre-molars is the tooth of choice for sampling.
 - ✓ Contaminated equipment and improper procedures can result in needlessly exposing the bear to infection and a broken/abscessed tooth.

Morphological Measurements

- As a minimum, record the chest girth as a means of estimating the bear's weight. Measurement should be taken just behind the shoulders, and the tape should fit snug, not overly tight. Use the chest girth/weight conversion chart in the Appendix (*Figure 22*) to determine estimated weight. If possible though, get an actual weight on the bear, either by weighing it in the field (*Appendix – Figures 20, 21*) or driving the trap across truck scales.
- Other measurements may be taken if there is a specific need. These would include:
 - ✓ Width and length of a front and rear paw. (*Appendix – Figure 23*)
 - ✓ Overall body length – tip of nose laterally to base of tail.
 - ✓ Neck girth.
 - ✓ Height at shoulder – top of shoulder blade to ankle joint, with leg straight.
 - ✓ Gum line and various tooth measurements.

Notes

- Finally, record any other pertinent information. Mother bear or sibling ID numbers, collar frequencies, noteworthy behavior, etc. In short, anything that could potentially be used in decision making if there are subsequent captures.

Recovery

- Assure the bear is lying in either sternal or lateral recumbency and that it has an open airway.
- You can apply some type of stimuli if you want to shorten the recovery time. Hosing the animal down with water and patting it on the shoulders works well. Note: this usually works better if the immobilization drug is mostly metabolized.
- Full recovery from the drugs usually takes several hours. It is best to plan on keeping the bear confined in the trap overnight and releasing it the next day. However, in some cases you may not be keeping the bear confined during recovery, and allowing it to recover from the drugs and then wander off. It is recommended that you stay with the animal until such time that it can protect itself from other animals. This usually means being able to lift its head and look around freely. Also be sure to place the animal in such a way that as it regains use of its legs and wobbles around it does not stumble into a creek or any other area where it may asphyxiate.

CONCLUSION

Today's wildlife professional is often faced with challenges involving human and wildlife conflicts. How these situations are resolved is often left to the discretion of responding personnel, yet it can mean the difference between a peaceful solution where the public gains valuable and educational information, and a serious conflict resulting in property damage or human injury. Documenting your actions and following policy are essential to reducing your liability, as is resolving the conflict in an efficient and professional manner. Your actions should represent a concern for public safety first followed by safety for the animal in hand. Proper identification of every animal handled and released assures the availability of a reliable data base that can be used in future management decisions and to protect NDOW personnel should a bear become aggressive or pose a public safety threat.

Bears are native to Nevada and evidence suggests they have been around for at least 150 years at varying densities. It is clear that they are increasing in number, in Nevada and elsewhere in their range. This persistence means that human and bear conflicts will continue to occur. The frequency and severity of these conflicts is dependent on the actions or inactions that humans take while living and recreating in bear habitat, as well as our ability to manage bears as a big game species.

MANAGING BEAR-HUMAN CONFLICTS

APPENDIX



Figures 1, 2 and 3 – Free-range captures offer their own unique challenges.



SCENARIOS

- Scenario A – A state assemblyman calls to complain that a bear has attacked his horse. Upon investigation you find the horse to be injury free but very sick. The ranch hand states that a bear has been frequenting the ranch’s garbage dumpster for over a week.
 - ✓ Anytime you are dealing with a political figure or anyone else who has the media’s attention be sure to document everything, including taking photographs.
 - ✓ Don’t become adversarial; even if the reporting party is untruthful, it’s not worth it.
 - ✓ Treat these types of people as you would anyone else; doing something different cannot be justified.
 - ✓ Set a trap only if you would normally do so.
 - ✓ Advise RP to remove all attractants or otherwise make them inaccessible to wildlife, i.e. a bear-proof dumpster. Refer to county code enforcement officer.

- Scenario B – a bear has been frequenting an urban-interface area and accessing human trash and bird feeders. Examples include; Galena Forest Estates, Incline Village, west Washoe Valley, Verdi or Genoa.
 - ✓ Your first option should be to remove all attractants and let the bear re-learn behavior that tells it the area no longer provides a food reward.
 - ✓ An on-site release (if the bear is trapped) would be any area on the edge of the urban-interface, as close to the capture site as possible. Public education is the key to resolving these types of conflicts.

- Scenario C – a bear wanders into populated area, is frightened and then climbs a tree, or is observed hiding in a backyard.
 - ✓ If the area borders Forest Service or BLM land (or any suitable habitat) your first option may be to let the bear retreat on its own. Give the bear some space by moving people and pets back a minimum of 50 yards, leaving an open escape path for the bear. Turn off patrol vehicle lights and reduce the amount of noise as much as possible.
 - ✓ If you decide to immobilize the bear you will need to do all of the above anyway. Furthermore, if immobilization is necessary you will need to consider the following:
 - What will the bear do when hit with the dart? If it has climbed a tree it may end up climbing higher. Are you prepared to climb up and lower it to the ground? Are you prepared to break its’ fall with a net or tarp?
 - If on the ground the bear may suddenly take off running. If you have made a good shot with the dart and you are comfortable with your dosage then you should insure that public safety officers are aware that the bear may run and that they should avoid lethal ammunition. Ask them to stay as far back as possible while maintaining a visual on the bear.
 - Do you have some way of retrieving the bear once it is immobilized? A tarp works well if you have enough people to help. Avoid immobilizing a bear if there is chance it could end up in a lake or river.
 - ✓ Depending on the location you may consider setting a trap and then leaving the area.

- Scenario D – a bear has been depredating on bee hives (apiary) in an open field in a rural area; or a bear has been raiding fruit trees.
 - ✓ Have the land owner consider electric fencing which is affordable and very effective in most situations.
 - ✓ Sometimes, just having the owner remove all ripened fruit is enough to avoid conflicts.
 - ✓ Trapping the bear in this situation would normally be fairly easy but it may not be the best solution. Again, if you trap and remove the bear it will likely return. Killing a bear in this situation is not solving the problem either, although per NDOW policy both are acceptable temporary solutions.

- Scenario E – a mother bear with two cubs has been reported in an area several times.
 - ✓ Regardless of what you decide to do in this situation, the underlying goal should be to keep the family group intact.
 - ✓ Hazing the bears may work but only if the residents are very cooperative in removing attractants, which is rarely the case.
 - ✓ If you set a trap you will need to capture all three bears before moving any of them. Placing more bait in the front of the trap, underneath the bait bag, will help insure that all three bears are inside feeding before the door shuts. Avoid placing any bait with a foot or two of the door!
 - ✓ Warn residents that if the door is closed to be very careful approaching the trap. If a cub(s) are inside and the sow is outside the trap, she may be very aggressive in protecting her young.
 - ✓ If all the bears cannot be captured then you should strongly consider releasing on site after you have collected the necessary data.

- Scenario F – In late January you are called to remove a bear from under a house. A plumber, checking to see why the water wasn't working, found a large bear denning under the structure. The homeowner, who lives in Napa, is afraid for the children.
 - ✓ One of the easiest ways to deal with this situation is to first explain that the bear is just hibernating, it really isn't a serious threat and probably won't emerge until spring, at which time they could seal up the entrance. At this point approximately 50% of homeowners will elect to leave the bear alone.
 - ✓ If they want the bear removed tell them that if you do remove it they will need to seal up the entrance immediately, with some permanent measure. Installing just plywood or lattice will be futile.
 - ✓ Using bear dogs or shooting cracker shells under the house are probably the best ways to get the bear out. Bear pepper spray also works well but can ventilate up in to the home.
 - ✓ It may not seem the smartest thing to do but generally speaking if you crawl under the house, locate the bear and make some noise it will choose to leave. Remember to leave it an escape path; you don't want to be in the way.
 - ✓ Approximately 50% of the time the bear, by sheer coincidence will not be under the home when you get there. Have the owner seal it up immediately.



Figure 4 – Apply ophthalmic ointment to both eyes



Figure 5 – Face shroud and hobbles



Figure 6 – Tattoo numbers appear backwards. Example above is # 26



Figure 7 – Tattoo surface should be clean and dry



Figure 8 – Apply liberal amount of ink



Figure 9 – Squeeze tattoo pliers firmly



Figure 10 – Completed tattoo



Figure 11 – Affixing ear tag



Figure 12 – PIT tag gun with needle attached properly



Figure 13 – Inject PIT tag subcutaneously between ears, posterior to center of head



Figure 14 – Blood draw from carotid artery



Figure 15 – Tattoo process-Mouth speculum



Figure 16 – Tattoo process-Elevator used to separate surrounding tissue from tooth



Figure 17 – Tattoo process-Pulling the 1st upper premolar



Figure 18 – Processing multiple bears

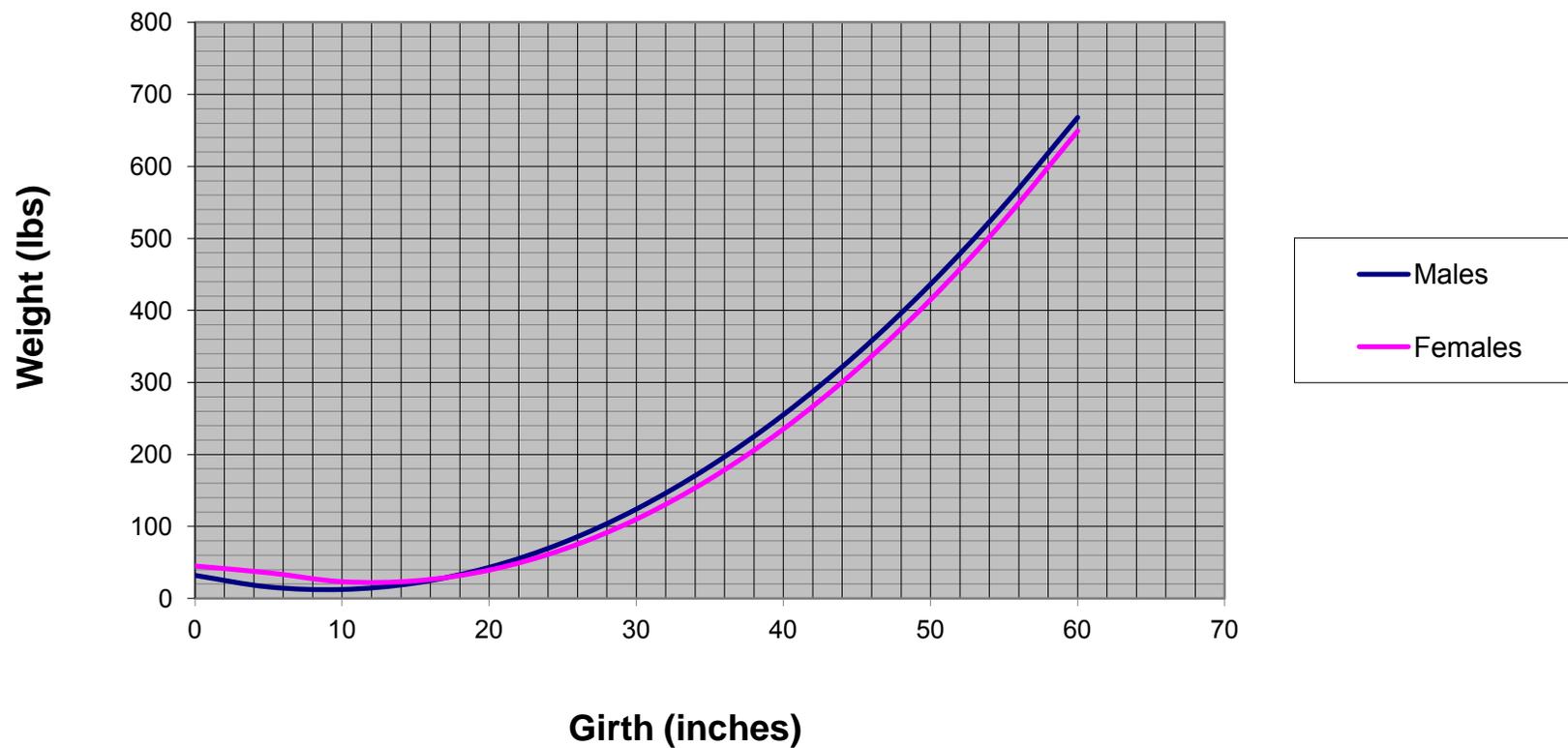


Figure 19 - Logs positioned to allow young cubs access to the trap.



Figures 20, 21 - Methods for weighing bears

Weight Estimation for Nevada Black bears



ESTIMATING BLACK BEAR AGE USING TOOTH WEAR

(TEXT AND CONCEPT DERIVED FROM *ARIZONA BLACK BEAR FIELD GUIDE*)

Permanent teeth erupt during the bears first year. Because tooth wear can be so variable only estimated ages can be assigned to each animal. Actual ages are best determined with cementum aging techniques. When aging bears with this method they can be divided into six categories: cubs (less than one year); yearlings (1-2 years); sub-adults (2-3 years); young adults (4-7 years); middle age adults (8-15 years); and older age adults (16+ years).

1. Do tips of upper canine show obvious wear?

- Yes ----- see page 24 – 1a
- No ----- see page 24 – 1b



Above – canine tip with obvious wear (age 8+)

Below – canine tip with no obvious wear (age 7 or less)



1a - Do all teeth have extreme wear with 2 or more canines broken and/or worn smooth?

- Yes-----old adult – 16+ years
- No-----middle age adult – 8-15 years



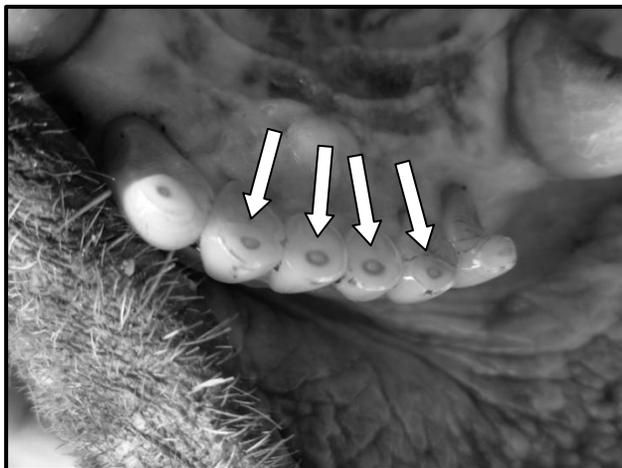
All teeth with extreme wear – 16+



All teeth with moderate wear – 8-15 years

1b – Are both 1st and 2nd upper incisors rounded to flat with dentine spots showing in the center of crown?

- Yes-----young adult – age 4-7 years
- No-----see page 25 – 2a



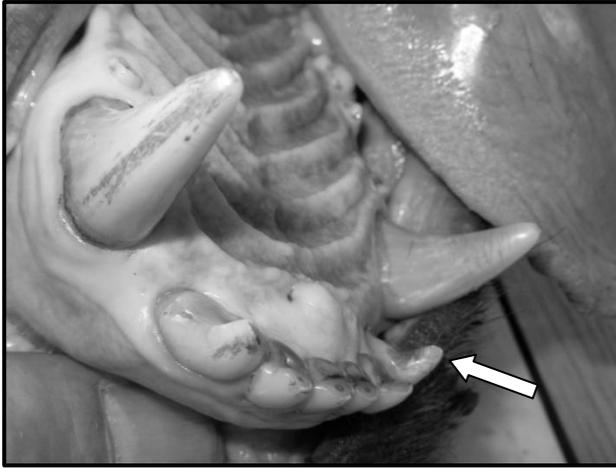
1st and 2nd upper incisors rounded to flat with dentine spots showing



1st and 2nd upper incisors not rounded to flat with no dentine spots showing

2a – Do cusps on 1st upper incisor show wear?

- Yes----- sub adult – 2-4 years
- No----- see below – 3a



Cusp of 1st upper incisor with wear



Cusp of 1st upper incisor without wear

3a – Do all upper incisors and canines appear to be permanent teeth?

- Yes----- yearling – 2 years
- No----- cub of year – 11 months

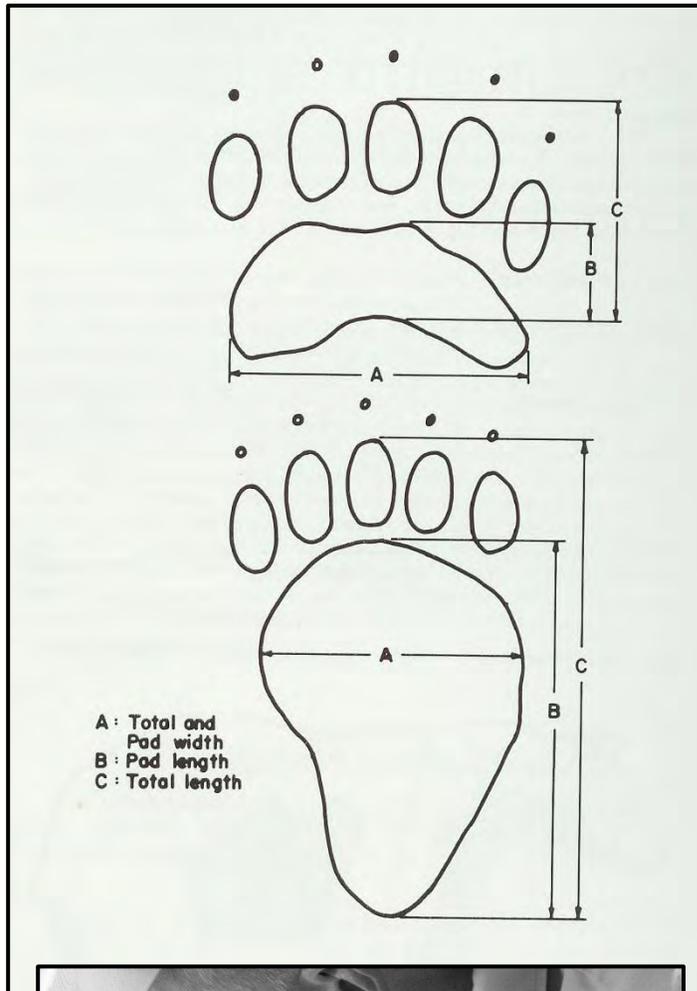


2 year old with all permanent teeth



4 month old cub with no permanent teeth

Figure 23 – Proper way to measure paw length and width



Telazol - Immobilization Cheat Sheet

Under most conditions you will reconstitute one vial of **Telazol with 2.5 cc of Xylazine**. This will give you a cocktail of 200mg/ml Telazol (200mg/cc).

At this concentration you will dose most bears at 2mg/lb.

Use the following guideline for example for dosages:

Small bear (100 lbs) = 1cc or 200mg

Medium bear (200 lbs) = 2cc or 400mg

Large bear (300 lbs) = 3cc or 600mg

(Use the same dosages for mountain lions)

If you add a different amount of diluent it will give you a different concentration per ml of Telazol:

2.0ml of diluent = 250mg/ml Telazol

5.0ml of diluent = 100mg/ml Telazol

Remaining Telazol can be frozen for future use.

Figure 24 – Telazol Cheat Sheet



NEVADA DEPARTMENT OF WILDLIFE
WILDLIFE IMMOBILIZATION FORM

ID: _____

Date _____ Species _____ Location _____

Animal ID _____ [] Rt [] Lft Collar _____ Pit tag _____
Tag color, number, tattoo, etc. Implant number and location (affix Biomark tag in Comments section)

Sex: [] Male [] Female [] Uk Age _____ (est. or actual) Weight _____ lbs (est. or actual) Color _____

Recapture: [] Yes [] No Release: [] Yes [] No Capture Method Body Condition
 [] Trap [] Excellent (above avg. fat stores)
 Release Location _____ [] Free-Range [] Good (average for species)
 [] Manual Restraint [] Fair (thin, sickly)
 Reproductive Status _____ [] Poor (emaciated)
Nursing, Dry or NA

Immobilization:

Drugs <small>Xylazine/Telazol= (XZT)</small>	Vial #	Dose (mg)	Time			Induction time <small>Darting to recumbency- in minutes</small>	Delivery System <small>Rifle, blo-gun, etc</small>	Route <small>IM, IV, SC</small>	Success of Delivery <small>Y or N</small>
			Injection	Ataxic	Induction				

Complications (inclement weather, crowds, etc.) _____

Vital Signs:

Time	Body Temperature (°F)	Heart rate (beats per/min)	Respirations (breaths per/min)	CRT (secs)

Recovery:

Reversal Drug-if used	Dose (mg or ml)	Route (IV, IM or SQ)	Time	Was antagonist effective? Y or N	Estimated time of recovery

Samples collected:

Comments: (include injuries, broken teeth, abnormalities, additional release information, etc)

Name: _____
Individual responsible for drug usage

COMPARISON OF BLACK BEAR PAWS TO HUMAN HANDS AND FEET

Identification Guides for Wildlife Law Enforcement No. 11

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Partial wildlife remains found out of context cause much concern over the possibility that the unidentified remains may be of human origin. Wildlife forensic scientists are often asked to identify unearthed bones found near human activity areas, such as new home construction, excavation sites, etc. (See Figures 1 and 2.) There have even been cases involving skinned bear paws that had been deliberately placed in public areas to startle those who mistaken them as human hands. Gilbert (1993) suggests that paw bones discarded at taxidermy “dump” sites could also be confused with human remains. Because bear paws and human hands and feet are similar in overall size and shape (Figure 3), morphological examination of the skeletal elements are required to enable forensic scientists to identify partial remains in cases where the skin and/or claws are absent.

The illustrations used here provide specific characters that can be used to differentiate between bear paws and human hands and feet. Figures 3 and 4 compare bear paw bones (without claws) and human hand bones. Figures 5 and 6 depict these features as seen with x-ray. Although access to x-ray machines for analysis can be limited for field investigators (package scanners may work in a pinch), radiographs often prove useful in visualizing osteological features on specimens that still retain soft tissue.

More information on bear/human skeletal comparisons can be found in the literature including Walker’s *Wildlife Forensic Field Manual*, which includes additional comparison to mountain lion (see also Orcholl and Hudson 2001, Gilbert 1993, Hillier and Bell 2007, Hoffman 1984, Klepinger 2006, Owsley and Mann 1990, Stewart 1959). Differentiation between species involves visual macroscopic examination of the overall shape and configuration of the skeletal elements and articulating surfaces (joints). The project required use of morphological standards of *Ursus americanus* (North American Black Bear) and *Homo sapiens* hand and foot bones as comparative reference materials and was conducted at the National Fish and Wildlife Forensic Laboratory (NFWFL) in Ashland, Oregon. Photos by NFWFL unless noted otherwise.



Figure 1. Skinned bear paw exhibits “finger-like” human features. Photo by Constable Timothy Anderson, Alexis Creek Detachment Royal Canadian Mounted Police (British Columbia).



Figure 2. Skinned bear paw (“palm up,” terminal phalanges/claws removed) that could easily be confused with human remains. Note similar size to human hand pictured, and the diagnostic deep grooves that identify the distal ends of bear phalanges. Human fingers (excluding thumbs) have three bones (phalanges) in each finger beyond the palm. The remains pictured here have two (a hint that bear claws have been removed.) Photo by Constable Timothy Anderson, Alexis Creek Detachment Royal Canadian Mounted Police (British Columbia).

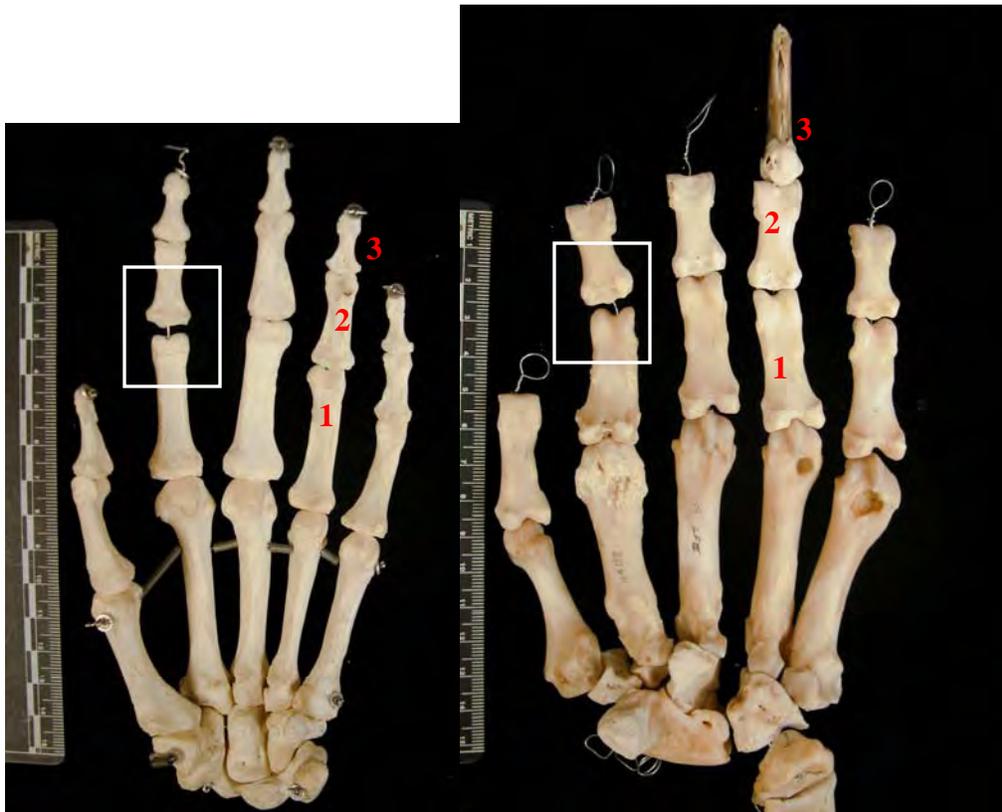


Figure 3. **Left:** skeletal elements of left human hand (*Homo sapiens*, palm up). Note terminal phalanges, labeled as phalanx 3, are present (third finger “tip” bones farthest from long palm bones shown joined with wire). **Right:** black bear paw (*Ursus americanus*, front left), shown without terminal phalanges/claws (except digit IV) to illustrate similarity in appearance with human. Insets: see Figure 4 for close-up view.

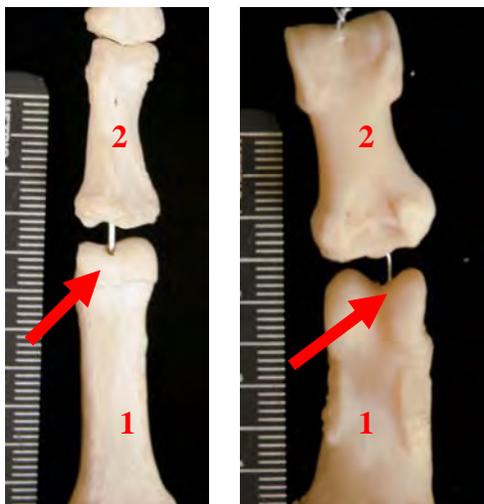


Figure 4. Insets from Figure 3. **Left:** Human phalanges showing slightly depressed shape of articular surface of first phalanx. **Right:** Black bear phalanges showing deep V-shaped groove of first phalanx, also clearly visible in the bear remains depicted in Figure 2.



Figure 5. **Left:** X-ray of left human hand showing relatively smooth flat shape of articular surface of first phalanx. **Right:** X-ray of left front black bear paw showing deep V-shaped groove of first phalanx

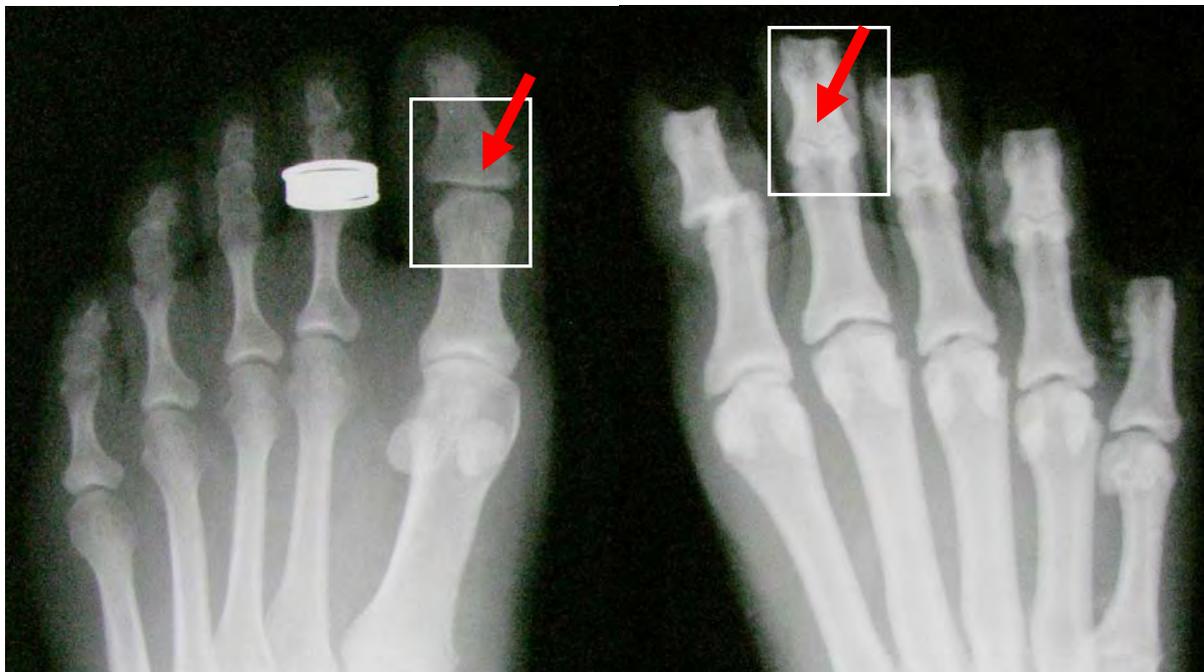


Figure 6. **Left:** X-ray of left human foot showing relatively smooth flat shape of articular surface of first phalanx. **Right:** X-ray of left rear black bear paw showing deep V-shaped groove of first phalanx

References:

Diagnostic Criteria for the Comparison of Human and American Black Bear Skeletal Elements. Jackie L. Orcholl and Dr. Jean Hudson. 2001. University of Wisconsin – Milwaukee. June 13, 2007. <http://www.uwm.edu/Dept/Grad_Sch/McNair/2001/jackieorcholl.htm>.

Gilbert, B.M. 1993. *Mammalian Osteology*. Columbia: Missouri Archaeological Society. Laramie, WY.

Hillier, M.L., and L.S. Bell. 2007. Differentiating human bone from animal bone: a review of histological methods. *Journal of Forensic Sciences* 52(2):249-263.

Hoffman, J. Michael. 1984. “Identification of Nonskeletonized Bear Paws and Human Feet,” in *Human Identification: Case Studies in Forensic Anthropology*, edited by T. A. Rathbun and J. E. Buikstra, pp. 96-106. Springfield: C. C. Thomas Publisher.

Klepinger, Linda L. 2006. *Fundamentals of Forensic Anthropology*. John Wiley & Sons, Inc.

Owsley, D.W., and R.W. Mann. 1990. Medicolegal case involving a bear paw. *Journal of the American Podiatric Medical Association* 80(11):623-625.

Stewart, T.D. 1959. Bear paw remains closely resemble human bones. *FBI Law Enforcement Bulletin* 28(11):18-22.

Walker, Danny N. and William J. Adrian. 2003. *Wildlife Forensic Field Manual*, 3rd Edition. Association of Midwest Fish and Game Law Enforcement Officers, p 219-221.