

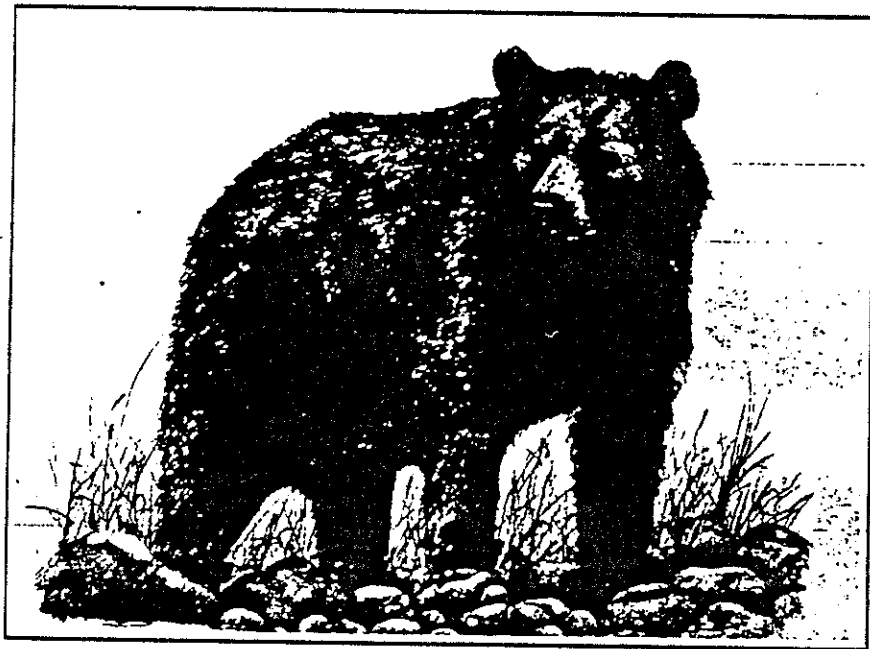
SWR
BIBE
SCRM
NRM
MAMMAL
LeCount
Black
1986

02/878 0164

①

BLACK BEAR FIELD GUIDE

by ALBERT L. LeCOUNT



A Manager's Manual



135 pp.

© PROPERTY OF
Science and Resources Management
Big Bend National Park, Texas

02/878 0164

BLACK BEAR FIELD GUIDE

A MANAGER'S MANUAL

ALBERT L. LeCOUNT



Special Report
Number 16

ARIZONA GAME AND FISH DEPARTMENT
Bud Bristow, Director

ARIZONA GAME AND FISH COMMISSION

W. Linn Montgomery, Flagstaff, Chairman
Fred S. Baker, Elgin
Larry D. Adams, Bullhead City
Frances W. Werner, Tucson
Thomas G. Woods Jr., Phoenix

All photographs by Albert L. LeCount
unless otherwise credited

First Printing 1986
Research Branch
Arizona Game and Fish Department
2222 W. Greenway Road
Phoenix, Arizona 85023

Copyright © 1986 Arizona Game and Fish Commission
ISBN 0-917563-04-2

This publication is a result of studies undertaken with financial support provided by the Federal Aid to Wildlife Restoration Act (Pittman- Robertson) Project W-78-R of the Arizona Game and Fish Department. The Act is popularly known as the Pittman-Robertson Act after its Congressional sponsors. The Act provides for a manufacturers' tax on sporting arms, pistols, ammunition and certain items of archery equipment. The collected tax monies are apportioned to the states and territories on a formula basis by the U.S. Fish and Wildlife Service for the conservation and management of wild birds and mammals. Thus, the sport hunters, target shooters and archers are the contributors to a program which benefits everyone.

Contents

INTRODUCTION	1
RECOGNIZING BEAR SIGN	4
Tracks.....	4
Trails.....	6
Rolled Rocks.....	9
Logs or Stumps Torn Apart.....	10
Scats.....	10
Chewed Signs.....	10
Tree Chewing.....	12
Rub Trees.....	15
Tree Stripping.....	17
Beds.....	17
CAPTURE, IMMOBILIZATION AND TRANSPORTATION	18
Capture.....	18
<i>Culvert Traps</i>	19
<i>Snares</i>	22
<i>Ketch Poles and Ropes</i>	24
Immobilization.....	24
<i>Drugs and Dosages</i>	24
Sernylan.....	25
Ketamine-Rompun.....	26
M-99.....	27
Alpha-Chloralose.....	28
<i>Weight Estimation</i>	30
<i>Drug Delivery Systems</i>	32
Cap-chur Guns and Darts.....	32
Jab-sticks.....	36
Blow-guns.....	38
Hand Syringes.....	38
<i>Injection Sites</i>	40
<i>Second Injections</i>	40
<i>Unrestrained Drugging</i>	41
<i>Animal Safety</i>	42
<i>Personal Safety</i>	43
Transportation.....	46
Checklist of Capture Immobilization and Transportation	
Equipment.....	47
MARKING DEVICES	50
Ear Tags.....	50
<i>Ritchy Tags</i>	51
<i>Rototags</i>	52
<i>Tamp-R-Pruf Seals</i>	53
Neck Collars.....	53
Tattoos.....	56
Ear Notches.....	57

Introduction

This field guide is designed primarily for use by the professional wildlife manager. However, hunters, campers, and other individuals interested in bears may also find some information, such as how to recognize bear sign, or how to avoid campground bears, of interest and use.

Black bears are an animal that virtually all wildlife managers will encounter sometime during their careers. For some individuals this encounter may be nothing more than "checking-out" a hunter killed animal, while for others it may involve frequent responses to campground and nuisance bear problems. In either case, managers need information on bears to help them do their job.

Some information is available, but unfortunately it is scattered through a variety of publications not readily available to the wildlife manager. This field guide is an attempt to bring pertinent black bear information together where it can be more effectively used. Some of the information has been gleaned from other publications and from conversations with people working with black bears throughout the United States and Canada. Much of the other information is based on my own personal experience and thus is presented without literature citations. Selected references are provided, however, for those that would like to spend more time studying black bears and their biology.

This field guide is divided into five sections. The first section deals with recognizing bear sign. Section two covers capture, immobilization, and transportation of bears and should be useful when it is necessary to capture and translocate an animal. Section three discusses marking devices such as ear tags, collars, etc., that have been proven under field conditions. The fourth section deals with techniques and procedures for gathering basic biological information and samples that are important to any bear management program. The final section deals with procedures for investigating and handling bear predation complaints.

Black Bear Field Guide

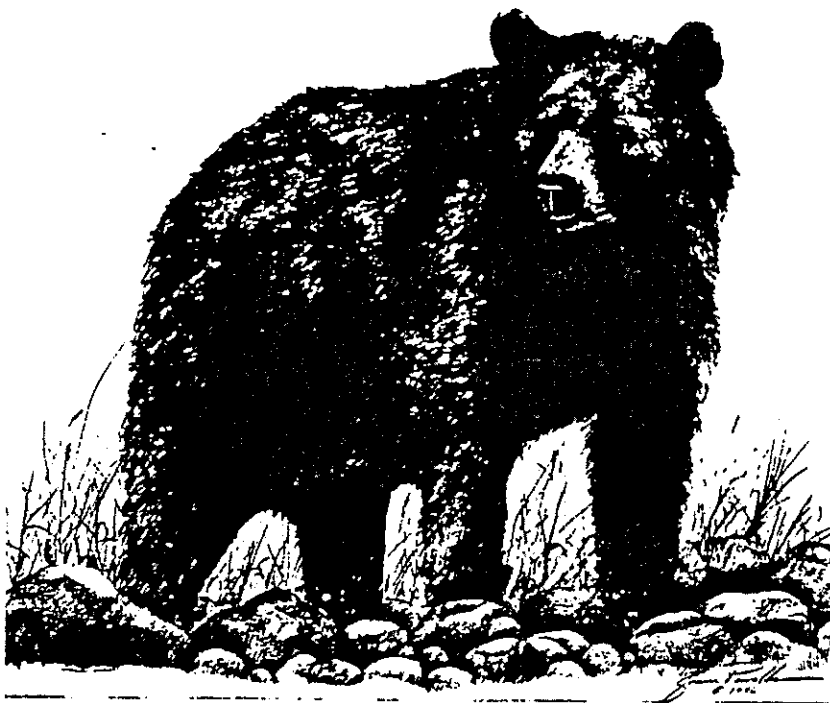
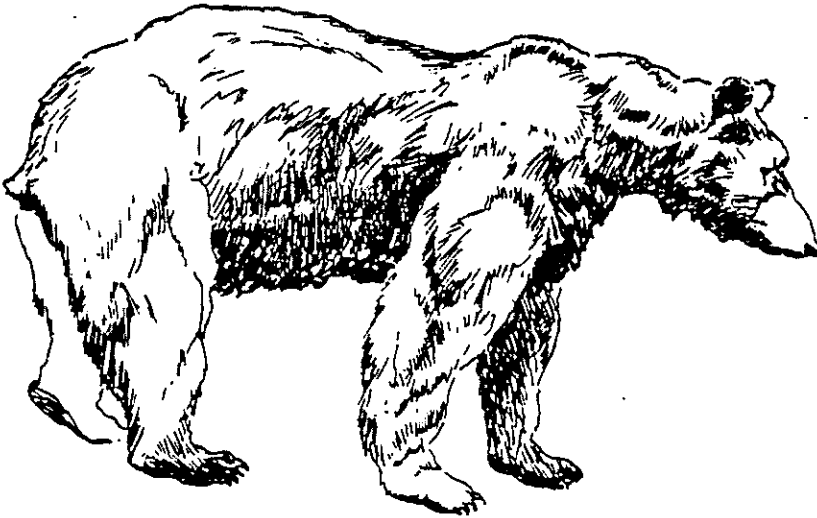




Figure 1. Comparison of size between the track of a 6-month-old black bear cub and an adult mountain lion - tracks normal size.



Figure 2. Bear trail - note marks in leaves where bears have stepped.



Rolled Rocks

Bears obtain a portion of the insects in their diet by searching for them under rocks. If the rocks are small, they'll flip them over with their nose. But if the rocks are large, bears will use their powerful shoulders and legs to roll them over. Overturned small rocks, however, cannot always be attributed to a bear since other animals such as skunks or coyotes will also roll over small rocks in search of food. Only two animals turn over large rocks, bears and man. Therefore, rolled large rocks in areas not frequented by people, are good evidence that a bear has been feeding (Fig. 3). The number of rocks that have been rolled will depend on the extent of insect foraging done by the bear at the time, and may vary from only one or two, to situations where every rock in the area has been moved.

Evidence that a rock has been rolled over will usually persist for a year or more. Therefore, this type of sign can also be used to obtain some idea how recently or frequently bears feed in a given area. If the site where the rock had been lying before it was rolled over contains no leaves or other litter, the sign is fresh. If the site is obvious, but a few leaves or twigs have fallen into it, the bear was probably in the area a week or two earlier. If the site is not easily observed and full of dry leaves and twigs, it may be several months to a year or more old (Fig. 3).



Figure 4. Stump torn apart by bear in search of insects.

Figure 5. Bear scat - note size.

Figure 6. Bear chewed trail sign.



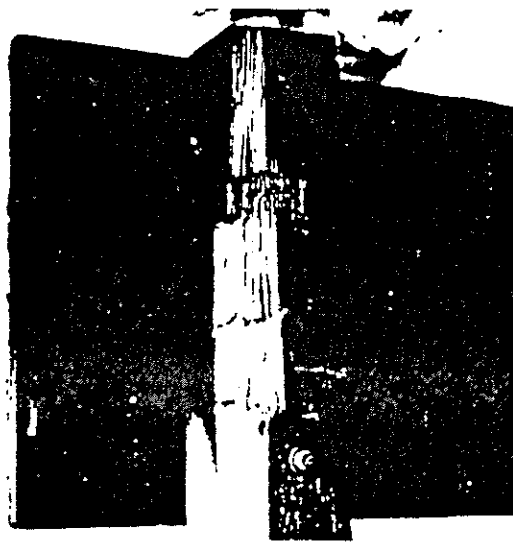


Figure 8. Sign post chewed by bear.



A



B

Figure 9. Bear tooth marks on a tree: (A) Tooth marks are made horizontally. (B) Tooth marks normally occur 5 to 6 ft. high on tree.



Bears normally mark trees with soft smooth bark such as pine, fir, aspen, sycamore, or cottonwood. Occasionally junipers and oaks will also be marked, but usually the tree is dead or dying and the bark has fallen away. Chewed trees are normally found in areas that bears frequent such as along stream beds, ridgetops, and maintained trails, and are normally oriented toward the route of travel. Chew marks are also often found in association with rub trees and careful examination of the bark below the mark will sometimes reveal bear hair (see RUB TREES).

Rub Trees

Rub trees are used by bears to help shed old hair and possibly for scent marking purposes. Rubbing may occur on small saplings and poles, large mature trees, and sign posts. Small saplings will normally be bent over and the tops broken as bears straddle them to rub their chest and bellies (Fig. 10). Hair is almost always left behind on rub trees and can be found with close examination (Fig. 11).

Larger rub trees may be of any species but are normally trees which can also be marked. Larger rub trees almost always have chew marks on them, but all chewed trees may not be rub trees. Several bears will usually select the same tree for rubbing and marking. As a result, the surface may become polished, and extensively marked (Fig. 12). Like chewed trees, rub trees are most often found in areas frequented by bears such as stream bottoms, ridge tops, or along maintained trails. They can also often be found by following bear trails (see TRAILS).

Figure 10. Small tree used for a rub tree by a bear - note broken top. Photo: Tom Waddell.

Figure 11. Bear hair attached to a rub tree. Photo: Tom Waddell.

Figure 12. Large rub tree used by bears for many years - note tooth marks near top of picture and polished appearance.

Tree Stripping

Tree stripping should not be confused with tree chewing. Chewed marks appear to be made to produce a mark for other bears to see, whereas a tree is stripped when a bear feeds on the cambium layer of the bark. The bear actually pulls the bark from the tree with its teeth and claws leaving marks in the underlying wood (Fig. 13). Most tree stripping occurs in the spring or early summer and several trees may be stripped in one area (Fig. 14). The most commonly stripped trees in Arizona are alpine fir (*Abies lasiocarpa*) corkbark fir (*Abies lasiocarpa* var. *arizonica*) and limber pine (*Pinus flexilis*). Tree stripping causes serious economic loss to the timber industry in the Pacific Northwest, because the bear usually girdles the tree causing it to die. In Arizona, tree stripping is not common. It appears to be most abundant in the Pinaleno Mountains near Safford and has also been observed in the White Mountains of east-central Arizona. It may also occur elsewhere in the state.

Beds

Bears dig beds much like deer or elk, but usually deeper. These beds are normally referred to as "day beds", even though they may be used either during the day or night. Bear beds normally occur in areas of dense cover and are usually up against large trees, logs, or rocks (Fig. 15). These trees and logs, and sometimes even the rocks, may have claw or tooth marks on them near ground level. Bears make these marks while lying or sitting in the bed. One or more scats may also be found on the perimeter of a bed and, if the bear remains in the area for some time, as many as 10 or 20 scats can accumulate. Also, if the bear remains in the area, two or three beds may be found in close proximity to each other. The reason for multiple beds is not known, but they do not necessarily indicate the presence of more than one bear.

Figure 15. Bear bed - note large size tree bed is placed against, and scat on left edge.

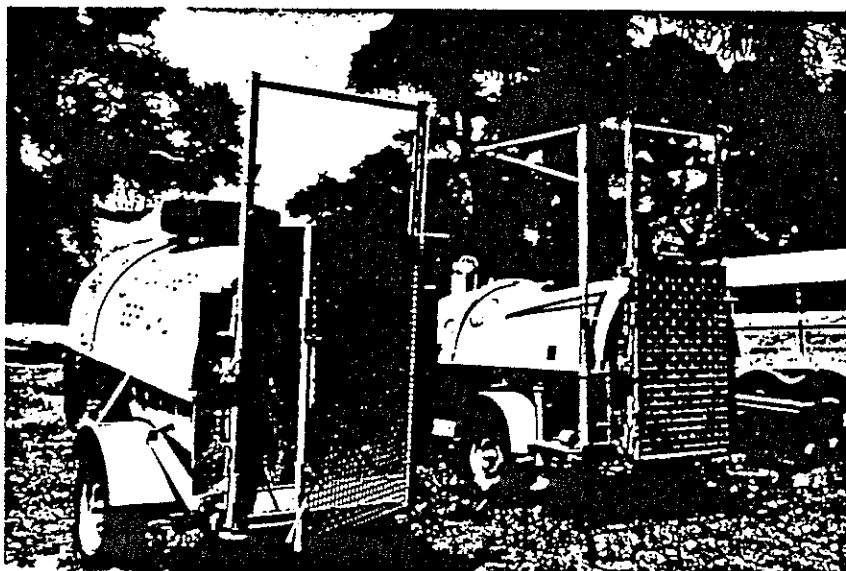


Culvert Traps

Culvert traps are basically a large barrel trap on wheels and are normally used to capture "nuisance" or "campground" bears (Fig. 16). They also can be used on "wild" bears in areas that can be reached by vehicle. Culvert traps have a drop or a type of swinging door on one end which is connected to a triggering mechanism in the back of the trap. When the bear enters the trap and takes the bait, the door closes.

Advantages of culvert traps are: they are simple to operate, most "campground" bears will readily enter them, the bear is not physically tied to any object, bears can be transported in them, and if properly constructed they are safe for both bears and any person who might come upon one with a bear in it. Disadvantages are: culvert traps are limited to areas accessible by vehicle, they can become hot due to solar heating of the metal surface and lack of ventilation, if improperly constructed they can cause injury to bears, (especially broken teeth from biting on ventilation holes or heavy metal screens), and culvert traps attract people which increases the risk of human injury either from the trap or by the bear.

Figure 16. Culvert trap with warning label. Photo: Tom Waddell.





Baits used in culvert traps vary from apples to zucchinis. The best bait will depend on availability. If possible, try to duplicate something the bear has been eating, but not something readily available. For example, in a campground where a bear has been eating from garbage cans, items such as meat scraps, fish entrails, or melon rinds can be found and all will produce an attractive odor.

To bait the trap put a small amount of bait outside, and a small amount just inside the door. Place the majority of the bait in the triggering device at the back of the trap. Also, remove all the garbage from nearby cans leaving the only available food supply in the trap.

Once a culvert trap is set it must be checked at least once a day. If this is not possible, don't set it. The best time to check traps for campground bears is early in the morning. Campground bears are usually more nocturnal than non-campground bears and most will be captured during the night. If a culvert trap is being used to capture non-campground bears, delay checking the trap until mid-morning. These "wild" bears are normally more active in the morning and evening and remain bedded during the day and night. Morning activity usually ends about 9:00 a.m. so checking later in the morning will reduce the risk of capturing a bear after the trap has been checked.

Upon capturing a bear in a culvert trap, immediately examine its physical condition. If it appears injured in any way, determine if it can be transported or must be handled at the capture site. Also, check its breathing. Poorly ventilated culvert traps can become hot causing bears to become overheated. A bear that is panting heavily, like a dog that has been running, is too hot and, if possible, should be cooled off prior to immobilizing. To reduce body temperature move the trap to a shady location or cool the bear with water.

All bears captured in campgrounds, or around other areas of human activity, should be moved to a quiet secluded place as quickly as possible. Trapped bears attract crowds and noisy people stress bears. Moving the animal will reduce the chance of injury to curious onlookers and allow concentration on the welfare of the bear.

There are many ways to capture bears with snares, but "cubby" and trail sets are most often used. "Cubby" sets consist of stacked brush and small limbs around a bait, with a single entrance where the snare is set. Brush and small limbs are recommended for "cubby" material rather than large logs to reduce injury to the bear. Most injuries caused by snares occur as a result of the snare cable becoming tangled and twisted in the "cubby" material, thus preventing the swivel between the foot loop and anchor portions of the snare from working properly. Small limbs and brush occasionally become tangled but tend to fall to the ground or break as the bear moves about. If the snare is anchored to a tree, all other trees stumps, rocks, etc. inside the cable radius should be removed to below ground level and all limbs should be cut off up to a height of about seven to eight feet. This will prevent the bear from looping the cable over a limb or twisting it around a solid stump. Snares should only be attached to a drag if a tree is not available at the proposed capture site. Bears caught in snares attached to drags are free to move away from the capture site before the drag becomes tangled. This movement increases the risk to personnel checking snares because the exact location of the bear is unknown, and increases the chances of a bear injuring itself by tangling the snare cable around trees, logs, or rocks.

A number of different baits can be used in "cubby" sets such as animal carcasses, fish, and produce. Keep in mind, however, that most bears must be attracted to "cubby" sets so baits should be large (10-20 lbs.) and odoriferous. Baits should be hung in the back of the "cubby" one to three feet above the ground. Baits laid on the ground can be pulled into the snare by the bear and baits hung near the top of the "cubby" can be reached without entering the set.

Trail sets amount to nothing more than setting a snare along a trail frequently traveled by bears. Such sets are less biased in the sex and age of bears captured because there is no bait or "cubby" material to make the bear suspicious. Therefore, a shy bear is just as apt to be captured as a more aggressive bear. If trail sets are used, however, care should be taken to place them only on bear trails not used by humans, domestic livestock or other wildlife (see TRAILS).

All snares should be set where they can be checked from a distance. This reduces human activity around the snare and makes it possible to determine from a distance if a bear is securely caught. **Snares should not be set if they cannot be checked at least once a day.** Failure to regularly check snares can result in the bear mutilating its foot, breaking bones, or even dying. In remote areas, snares should be checked about 9:00 a.m. after morning bear activity has ceased. This will reduce the likelihood of a bear being captured after a snare has been checked and from remaining in the snare until the next check,

within the brain to produce calming (tranquilization), depression (sedation), a trance-like or psychotic state, or complete loss of consciousness (anesthesia). The one exception is the curare-like drug Succinylcholine Chloride which was used in early bear work. This drug produces paralysis by blocking the transmission of nerve messages to the muscles. Due to its narrow safety margin and quick recovery time, however, Succinylcholine produced dangerous situations for both bears and biologists and it is no longer recommended. Currently four drugs are recommended and each has its advantages and disadvantages. Before any Department personnel can use a drug, however, they must first be trained and approved as outlined in the Arizona Game and Fish Department Policy Manual.

Sernylan

For most bear work, Sernylan (phencyclidine hydrochloride) has been the drug of choice. Advantages of this drug are: it has a wide safety margin, it is not likely to produce any severe side effects, and if handled properly is relatively safe for the biologist. Disadvantages are: Sernylan was removed from the market in July 1978 due to human abuse problems, currently its availability is extremely limited, and it occasionally causes convulsions in bears.

Sernylan is available in two concentrations (20 mg/cc and 100 mg/cc). Except for bears of 75 pounds or less the use of 100 mg/cc strength is recommended to reduce the volume of drug required. The recommended dosage of Sernylan under most situations is .5 mg/lb. of bear. Conversion of this drug dosage into cubic centimeters (cc) for the two concentrations of Sernylan are shown in Table 2.

Table 2. Recommended dosages of Sernylan for various size bears (.5 mg/lb of bear).

Weight (lbs.)	Dosage (cc's)	
	100 mg/cc	20 mg/cc
25	.12	.60
50	.25	1.25
75	.38	1.90
100	.50	2.50
125	.63	3.15
150	.75	3.75
175	.88	4.40
200	1.00	5.00
225	1.12	5.60
250	1.25	6.25
275	1.38	6.90
300	1.50	7.50
325	1.63	8.15
350	1.75	8.75
375	1.88	9.40
400	2.00	10.00

Table 3. Recommended dosages of Ketamine-Rompun for various size bears (3 mg/lb of bear).¹

Weight (lbs)	Dosages (cc's)		Total
	Ketamine (100 mg/cc)	Rompun (100 mg/cc)	
25	.50	.25	.75
50	1.00	.50	1.50
75	1.50	.75	2.25
100	2.00	1.00	3.00
125	2.50	1.25	3.75
150	3.00	1.50	4.50
175	3.50	1.75	5.25
200	4.00	2.00	6.00
225	4.50	2.25	6.75
250	5.00	2.50	7.50
275	5.50	2.75	8.25
300	6.00	3.00	9.00
325	6.50	3.25	9.75
350	7.00	3.50	10.50
375	7.50	3.75	11.25
400	8.00	4.00	12.00

¹Ketamine-Rompun mixed in 2:1 ratio.

The disadvantages of Ketamine-Rompun are: the large volume of drug needed for immobilization, especially for larger bears, and the rapid recovery time. Commercially available Ketamine is normally packaged at a maximum strength of 100 mg/cc. Rompun is available in both 100 mg/cc and 20 mg/cc concentrations, but 20 mg/cc is not recommended. With the 100 mg/cc combinations, the recommended drug dosage for a 300-pound bear would be 9 cc's of drug. This large amount is difficult to administer with any drug delivery system. To reduce the large drug volumes some individuals have had commercial laboratories freeze-dry Ketamine-Rompun to a dry powdered form (Clark et al. 1979). This dry form of the drug can then be reconstituted in the field to strengths of 200 to 300 mg/cc. These concentrations, however, are very unstable and crystallization of the drug may occur if it is not used immediately.

M-99

M-99 (Etorphine) has been used to a limited extent on bears. Advantages of this drug are: it has a wide safety margin for animals, low volumes are required, and the effects of the drug can be reversed at

Table 4. Recommended dosages of M-99 and M-50-50 for various size bears (M-99 = .05 mg/lb of bear).

Weight (lbs.)	Dosage (cc's)	
	M-99 1 mg/cc	M-50-50 2 mg/cc
25	.12	.12
50	.25	.25
75	.38	.38
100	.50	.50
125	.63	.63
150	.75	.75
175	.88	.88
200	1.00	1.00
225	1.12	1.12
250	1.25	1.25
275	1.38	1.38
300	1.50	1.50
325	1.63	1.63
350	1.75	1.75
375	1.88	1.88
400	2.00	2.00

Table 5. Recommended oral dosages of Alpha-Chloralose for various size bears (.03 g/lbs of bear).

Weight (lbs)	Dosage (grams)
25	.75
50	1.50
75	2.25
100	3.00
125	3.75
150	4.50
175	5.25
200	6.00
225	6.75
250	7.50
275	8.25
300	9.00
325	9.75
350	10.50
375	11.25
400	12.00



Imbedded darts or tissue damage can be a serious problem with the CO₂ rifle and the powder-charged gun. High gas pressure in these guns propel the dart from the barrel at high velocity. At close range, darts can be totally imbedded causing severe muscle damage and even death if the animal is struck in the thoracic or abdominal area. Rifles may be used at close range, however, if the dart velocity is reduced. This can be accomplished by pushing the dart down the barrel one-third to one-half of the distance toward the muzzle. By moving the dart down the barrel the size of the firing chamber is enlarged, which reduces the pressure and the velocity of the dart. Several practice shots fired into a target at close range can be used to determine impact when the dart is placed at various positions in the barrel.

Darts can also be moved down the barrel of the CO₂ pistol to reduce the velocity of the dart if it is used on a bear in a culvert trap. Capture rifles should not be used in culvert traps unless it is the only drug delivery system available, and then only if the dart is moved down the barrel.

Cap-Chur darts are comprised of five different parts; a needle, barrel, tailpiece, rubber plunger, and a powder charge that explodes upon impact (Fig. 20).

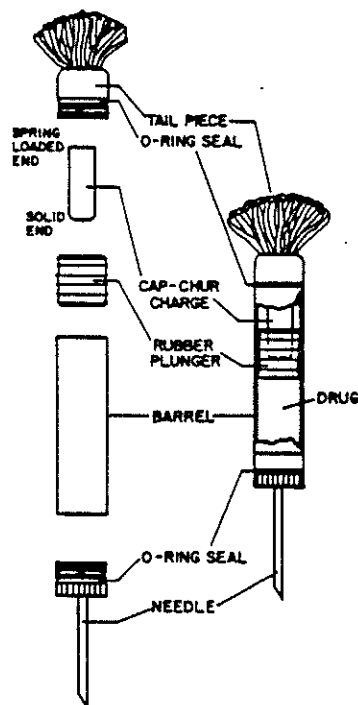


Figure 20. Diagram of Cap-Chur dart. Illustration: Matt Alderson.

Bears should be injected by darts equipped with 1-1/8 inch collared needles. This length will allow penetration through fat layers so the drug can be injected into underlying muscles, and the collar will allow the dart to remain in the bear long enough for full drug injection to be completed. Exceptions are when more than 3 cc of drug are needed. In these situations barbed needles should be used to assure that the dart will stay in the bear until all the drug is injected. However, the entire barb is not needed to hold the dart. It is best to cut the barb off just above the solder joint. The remaining barb is sufficient to hold the dart in place during drug injection and causes less tissue damage when it is removed from the animal.

Syringe barrels come in a variety of sizes ranging from 1 to 15 cc. Unfortunately, size is not printed on each barrel. To help determine barrel size see Figure 21. The size selected will depend on the volume of drug required.

Tail pieces are available in two types, plastic and yarn. Plastic tail pieces are recommended because yarn tail pieces tend to become matted or frayed with use. This can cause the dart to fly erratically, resulting in inaccurate dart placement. For close shots, if plastic tail pieces are used, adjustments for impact should be made because they create less friction in the gun barrel and thus increase dart velocity.

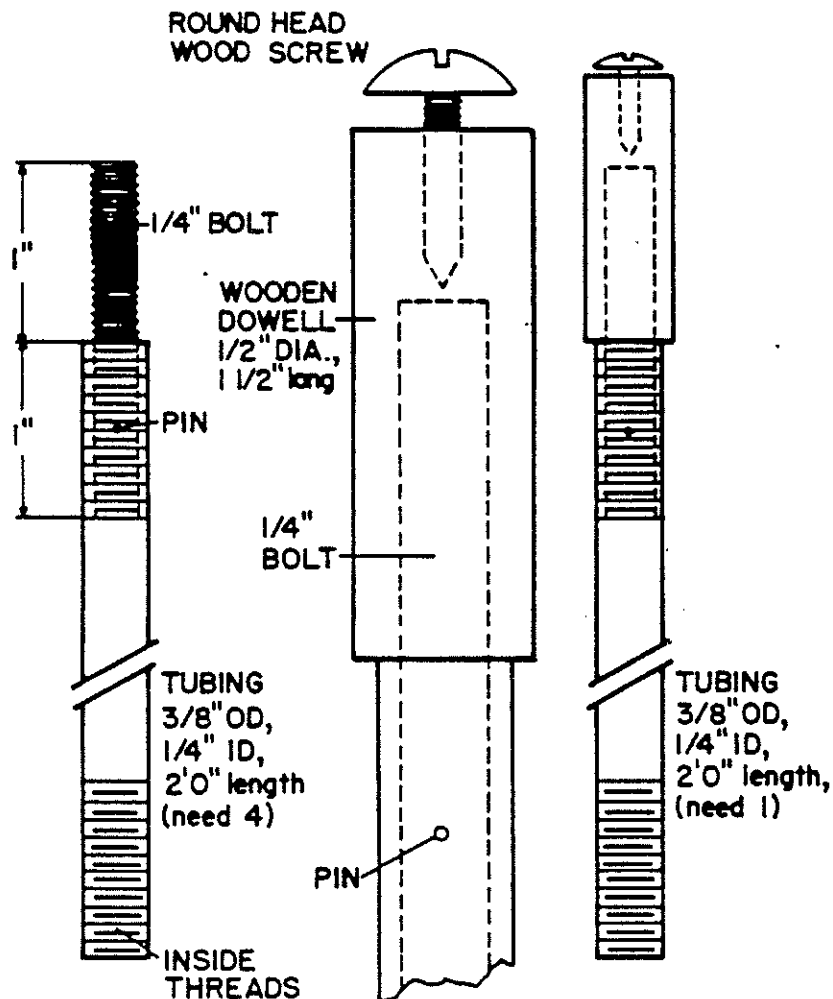
The rubber plunger and powder charge both fit inside the barrel of the dart (Fig. 20). Rubber plungers are the same size for all barrels, but charges come in three types, depending on barrel capacity. One charge is for 1-3 cc syringes, a second is for 4-10 cc syringes, and a third is only used in 15 cc syringes. The barrel size a charge is designed for will be printed on the charge container shipped from the distributor. It is important to use the proper powder charge in the correct size barrel to assure proper injection of the drug into the bear.

Improper loading of capture darts can also result in improper drug injection. To load darts, the rubber plunger should first be treated with a light coating of silicone lubricant. It should then be passed through the barrel several times to lubricate the cylinder and assure freedom of movement. If obstructions are detected, check the barrel for dents and discard any barrels in which the rubber plunger does not move freely. The powder charge should then be placed into the rubber plunger. Make sure that the solid end is forward, is enclosed in the plunger, and that the spring-loaded end is exposed (Fig. 20). If reversed, the charge may fire when leaving the gun and spray the drug on the shooter or it may not fire upon impact. The tail piece should then be attached after a light coating of silicon lubricant is placed on the "O-ring" seal. Proper drug dosage can then be added.

the plastic plunger handle can then be removed from a hand syringe, the rubber plunger placed over the screw, the syringe barrel slipped back over the rubber plunger, and the needle attached. Needles for jab-sticks should be 1 to 1-1/2 inches long and 16 to 18 gauge. This length and size will allow for adequate penetration and rapid drug flow from the syringe into the bear.

The technique for using the jab-stick is to approach the animal slowly. A poor jab will probably result in incomplete injection and immobilization. Carefully move the jab stick near the intended injection site (see INJECTION SITES). Then, in one smooth motion quickly and

Figure 22. Plans for variable length jab-stick constructed from 1/4 in. (I.D.) thick walled (0.93 in.) aluminum tubing. Illustration: Matt Alderson.



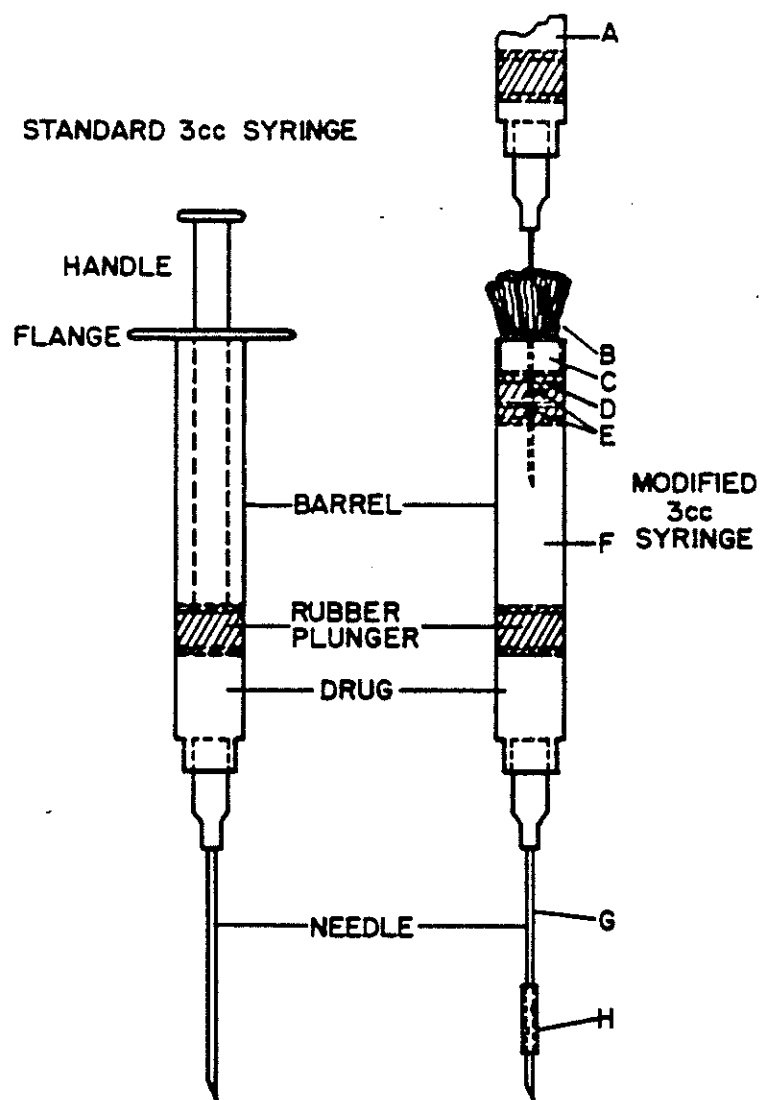


Figure 23. Technique for modifying a 3cc disposable plastic syringe for use as a blow-gun dart. (A) Standard syringe used to inject butane; (B) Yarn tailpiece embedded in silicone; (C) Flange on syringe cut off; (D) Rubber plunger from another 3cc syringe; (E) Needle inserted through the barrel to hold the rubber plunger in place with end cut flush to outside of barrel; (F) Chamber for butane; (G) Needle with tip sealed and new holes filed in side; (H) Vaseline and caulking material sealing needle outlet holes. Illustration: Matt Alderson.

Unrestrained Drugging

In some instances, a bear that is not physically restrained in a snare or culvert trap may have to be chemically immobilized. Two situations are common for these unrestrained captures. One is where the bear is on the ground, such as in a campground, but appears to be hesitant to enter a culvert trap. The other instance occurs when a bear has been chased up a tree by dogs or people. In each situation the chances for successful capture are poor at best due to the mobility of the bear and the presence of people.

Unrestrained bears on the ground are difficult to capture due to the time lag between when the drug is injected into the animal and when immobilization takes place. Depending on the drug used, this can range from three to 15 minutes for liquid drugs, and more than one hour for Alpha-Chloralose. Bears can travel a considerable distance, even in three minutes, and although they may become immobilized, they are almost impossible to track and locate.

Bears in trees also present problems. Some will climb down and flee the scene when darted, thus posing the same problems of tracking and locating the animal associated with ground captures. Another problem is that a drugged bear often tends to become disoriented and may fall out of a tree as the drug takes effect. Such falls can cause broken bones, internal injuries, and even death. If a bear is to be drugged while in a tree, someone should be prepared to climb the tree and attach a rope to the bear's leg before the drug takes full effect.

To attach the safety line, the tree climber should start his ascent as soon as the first symptoms of drug reaction are observed. The bear should be approached slowly. If it moves away, the climber should back-off and wait one or two minutes before reapproaching. This will prevent "pushing" the bear higher into the tree. Once the rope can be attached to the leg, it should be wrapped around the tree until the bear is completely immobilized. This will prevent the bear from pulling the climber out of the tree if it falls and will allow him to safely lower the animal to the ground. If no one is available to climb the tree and attach a safety line, it is best to not drug the animal, but instead attempt to get everyone away from the area so the bear can climb down and leave.

Unrestrained chemical restraint of bears should only be attempted as a last resort after all other types of physical restraint have been thoroughly evaluated.

While gathering data try to keep the bear on its side or sternum at all times. If a need arises to turn the bear over, do not roll it over on its back. This procedure can cause stomach material to be inhaled into the lungs. Instead, pick the bear up by the back and roll it over with its stomach pointed downward. This procedure will prevent possible lung infections from inhaled stomach fluids. If it is necessary to move the bear also be sure to keep the eyes protected by holding the head. Dragging a bear with its head on the ground increases the chances of injury to the eyes from rocks, sticks, and other sharp objects.

Once data collection is completed, adequate care should also be provided to the animal during recovery. With a long acting drug like Sernylan, stress is best reduced by placing the animal in a quiet secluded location and letting it slowly recover on its own. However, remember that the bear will not be fully recovered for three to four hours, so be sure it will remain in the shade and will not be discovered by other people during this time. If there is any chance someone might accidentally encounter the animal, stay nearby until complete recovery occurs and the bear leaves. Recovery is rapid with Ketamine-Rompun. When you finish your work, move out of the bear's sight to reduce stress and wait for it to recover. Care of an animal through recovery following use of M-99 is much simpler because the drug can be reversed with M-50-50 (see M-99).

Personal Safety

Human safety is as important as animal safety when chemically immobilizing bears. Remember, when handling bears you are dealing with animals that have the ability to kill you, and drugs that can do the same. **Don't treat either bears or drugs casually.**

All drugs should be clearly labeled, packed, and stored in a locked box or safe where they cannot break or become contaminated. Rubber gloves should be worn when handling drugs. Small cuts on hands can permit spilled drugs to enter the body producing serious problems. Accidental poisoning from Sernylan or Ketamine-Rompun can cause breathing problems, brain damage, or even death.

Persons using M-99 must take special precautions beyond those normally used for other drugs. As little as .1 cc of M-99 may be fatal to a human, and this amount can be left in a syringe or needle. Because M-99 is so potent, it should always be handled with extreme caution.

M-99 should never be used unless at least one other person is present. In the case of an accidental injection a person would not have time or the ability to give themselves the antagonist. Another person's help would be needed. The preferred antagonist for M-99 in humans is Narcan (Naloxone). Narcan, however, can only be obtained by trained emergency medical personnel, or a person possessing a



After the drug is loaded, be sure to record the amount used on the Wildlife Handling Form (Appendix III). This is not only required by Federal law and the Department, but it is also useful if subsequent injections are needed.

As preparations are made to drug a bear, especially one caught in a snare, personal safety checks should also be made. When a snared bear is first observed, check to see where it is caught. Is it caught by a front or hind foot? Usually bears are captured by a front foot but occasionally the snare may be on a hind foot. If this occurs, the bear has more maneuverability and can reach farther than when restrained by a front foot. Is the snare secure above the foot or is the animal only caught by two toes? Is the anchor cable free or tangled around objects? A snared bear's mobility is governed by the length of the anchor cable and it helps to know how great that mobility is before approaching.

When the bear appears immobilized, approach it slowly and quietly from the back side. In this way if the bear is not completely immobilized, it is much more difficult for it to charge than if it is approached from the front. While still outside the bear's reach, take a stick or pole and poke the animal several times both on the head and rump to determine if it is immobilized. Ear movement, eye focusing, or biting of the stick are indications that the animal is not ready to handle. Never walk directly up to a bear that has been drugged assuming that it is completely under the effects of the drug simply because the appropriate amount of time for immobilization has elapsed. When administering drugs under field situations, many things can go wrong such as incorrect weight estimates, poor dart hits, and incomplete drug injections. Any of these things may produce a partially drugged and potentially dangerous bear.

If Ketamine-Rompun is the drug being used, one additional check should be made immediately after blindfolding the bear. The weight estimate should be verified. Underestimating a bear's weight may result in the animal recovering sooner than expected. If scales are not available to weigh the bear, measure its chest circumference and compare the measurement to the weights shown on the weight-girth chart in Appendix IV. The amount of error in the weight estimate will dictate how long the bear can be safely handled before a second injection of Ketamine-Rompun is needed.

Checklist Of Capture, Immobilization, And Transportation Equipment

Having the proper equipment on hand when the need arises to handle a bear can make the difference between success and failure. Detailed information on the equipment needed for capturing, immobilizing, and transporting bears has been discussed in previous sections of this manual. Unfortunately, due to cost and limited supplies, all this equipment is not stored with every individual who might be called upon to handle a bear. When called to capture a bear a person often must go to a Regional Office or contact other wildlife managers to obtain the equipment needed. With this procedure an essential item can sometimes be overlooked. This equipment checklist is provided so that as one prepares to capture and handle a bear, all the equipment needed for a successful and safe capture is on hand.

1. Capture equipment (one or more of the following):

- _____ A. Culvert trap (for use in accessible areas, or campgrounds and other areas of high human density).
- _____ B. Snares (for use in inaccessible areas; should not be used in campgrounds or other areas of high human density unless monitored continuously).
- _____ C. Ketch-pole or ropes (should only be used when a slight amount of additional restraint is needed on a drugged bear; should not be used in the absence of chemical restraint).
- _____ D. Bait (10 to 20 pounds of odoriferous material).

2. Immobilization equipment

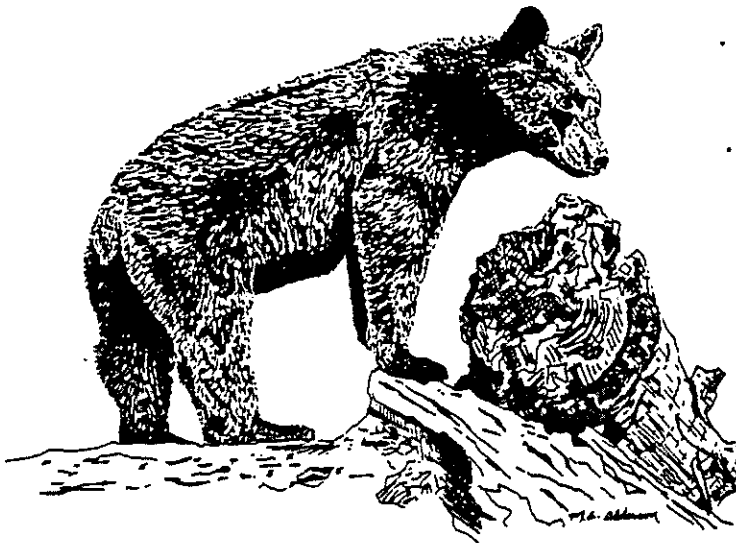
A. Drug delivery system (one of the following):

- _____ 1. Cap-Chur pistol - CO₂ (gun of choice for snared bears or for culvert trapped bears in the absence of a jab-stick).
- _____ 2. Cap-Chur rifle - CO₂ (can be used for snared bears if dart is moved 1/3 to 1/2 way down barrel; not recommended for culvert trapped bears).

- _____ 7. Extra CO₂ cartridges.
- _____ 8. Silicone lubricant (for lubricating rubber plunger, "O-rings", and sealing needle points).
- _____ 9. Injectable water (for adding to drugs to fill darts).
- _____ 10. Trash bags.

3. Transportation equipment (you will need one of the following).

- _____ A. Culvert trap (recommended for most situations).
- _____ B. Truck (suitable for Alpha-Chloralose immobilized bears).



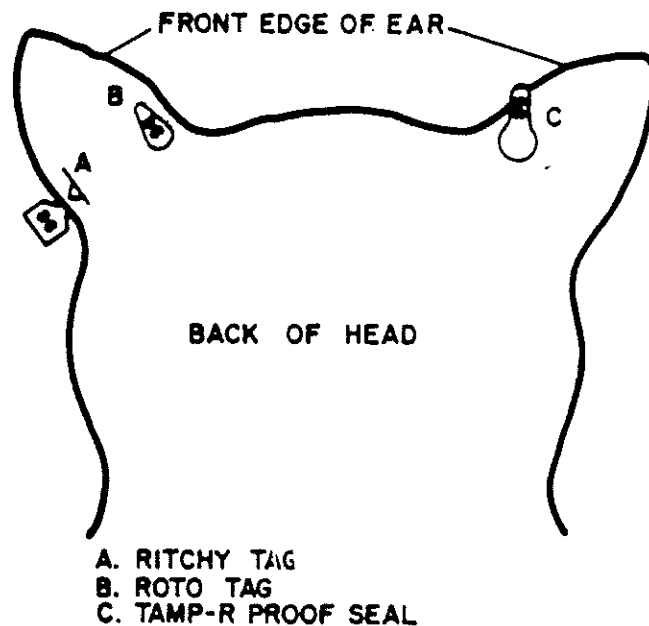
thus, the chances of permanently marking a bear with ear tags is greatly increased with a double tag system. Three types of ear tags appear to work on bears; Ritchy tags, Rototags, and the Tamp-R- Proof seal, but due to its disadvantages, the latter is only recommended in special situations. Suppliers for these tags are listed in Appendix II.

Ritchy Tags

Ritchy tags have worked well and are recommended for most bear tagging situations. Ritchy tags are a plastic cattle tag and are available in small, medium, regular, and jumbo sizes. The jumbo size is recommended for bears. Advantages of Ritchy tags are: they are easy to apply, cause little ear irritation, are rarely lost, are easily observed in the field, come in a variety of colors, and can be individually numbered. Disadvantages are: some colors look alike in the field, and numbers may fade if not properly applied.

Ritchy tags should be attached to the lower edge of the ear near the head (Fig. 24). A small easily portable tagging tool is commercially manufactured for applying Ritchy tags, but in its absence a small slit can be cut in the ear with a pocket knife and the tag inserted through this slit.

Figure 24. Proper tag placement. (A) Ritchy tag, lower edge near head; (B&C) Rototag and Tamp-R-Pruf seal, front, or leading edge, near head. Illustration: Matt Alderson.



Rototags come in blue, white, red, yellow and green. All colors can be used because the small size of a Rototag prevents colors from being confused in most field situations. Numbers and notification addresses can be affixed to Rototags according to the purchasers specifications, but this must be done at the factory. Numbers cannot be changed during application in the field.

Rototags are a good companion tag with Ritchy tags for double tagging bears. Since both ear tags are relatively permanent using one of each virtually guarantees a bear will be marked for life. A good tagging system is to put the Ritchy tag in the proper ear for sex identification (see RITCHY TAGS) and then place a Rototag in the other ear.

Tamp-R-Pruf Seals

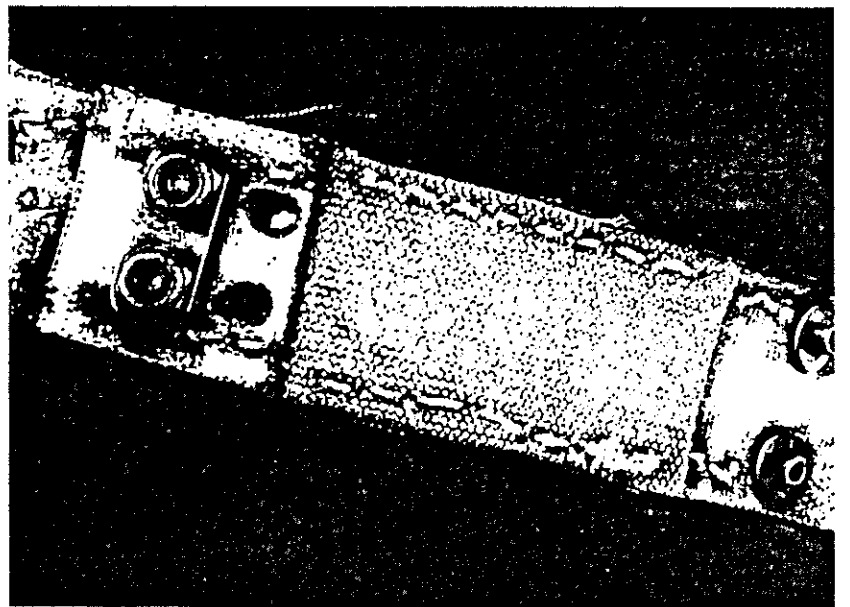
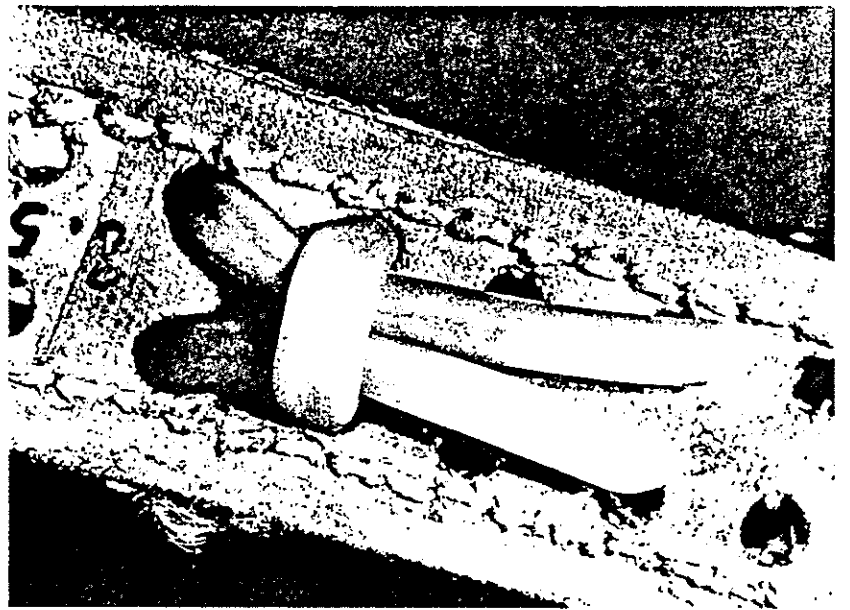
Tamp-R-Pruf seals are aluminum livestock tags and are available in sizes designed for sheep, hogs, and cattle. The hog tag is recommended for bears. Loss of Tamp-R-Pruf tags is relatively low, but it has a number of disadvantages: Tamp-R-Pruf tags must be pre-numbered at the factory according to the buyers specifications, they do not come in colors; are difficult to apply, cannot be observed in the field, and can cause irritation to the ear. Due to these disadvantages, it is recommended that Tamp-R-Pruf tags only be used if Ritchy or Rototags are not available.

Like Rototags, Tamp-R-Pruf seals should be attached to the upper, or front edge of the ear, as near to the head as possible (Fig. 24). To attach the tag, a hole must first be punched in the ear. The tag is then placed in a specially built tagging plier and riveted into place. When riveting the tag, care should be taken not to squeeze the tag too tightly. If this occurs, blood circulation to that portion of the ear may be restricted, resulting in infection and irritation. The best technique to avoid squeezing the tag too tightly is to apply pressure with the tagging pliers until the rivet is started. Then, rotate the tag in the pliers so that only the riveting portion of the pliers are in contact with the tag. With the tag in this position, additional pressure can then be applied to rivet the tag in place without flattening it.

Neck Collars

Radio and identification collars have both been used on bears and work well as semi-permanent markers that can be observed in the field. Disadvantages of collars are: over a period of time colors can fade and become indistinguishable, and on subadult animals, collars can become too tight if some mechanism is not used to allow the collar to expand or break-away.

Radio-collars are currently constructed from dacron/butyl rubber belting material by the manufacturer. Identification collars can also be made from this same material. For most bears, collars should be



letters punctured into the skin. Additional ink should then be thoroughly worked into the needle punctures with the fingers. When finished, a final check should be made to see that the tattoo is clearly visible and all needle holes are full of ink. If they are not, additional ink should be applied with the fingers until all punctures contain ink.

Ear Notches

When no other marking devices such as ear tags, collars, or tattoo equipment are available, ear notches are another technique that can be used to permanently mark a bear. Disadvantages of ear notches are: they disfigure the ear, they may go unnoticed by hunters or check station personnel, natural rips or tears might be mistaken for notches, and a marked animal cannot be observed in the field. Even with these disadvantages, however, ear notches are better than releasing a bear with no markers at all.

Ear notches can be made with an ear notching tool (Appendix II) or with a pocket knife. Notches should be made along the outer rim of the ear and an actual "V" shaped piece of the ear should be removed. A simple slit in the ear will not be detectable from other cuts that bears receive naturally. By locating notches at certain points on the ear, each bear can be given a specific number designation (Fig. 28).

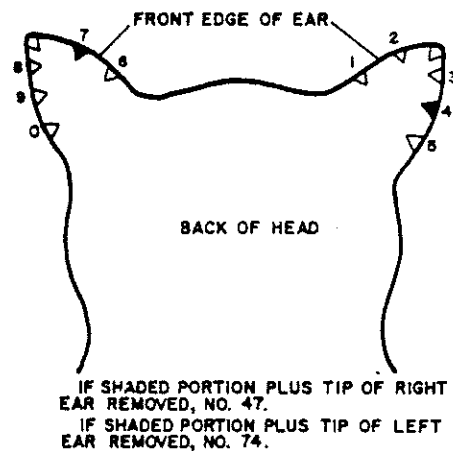


Figure 27. Tattoo on lower lip of bear.

Figure 28. System for numbering bears with ear notches - note ear with tip removed is read first.

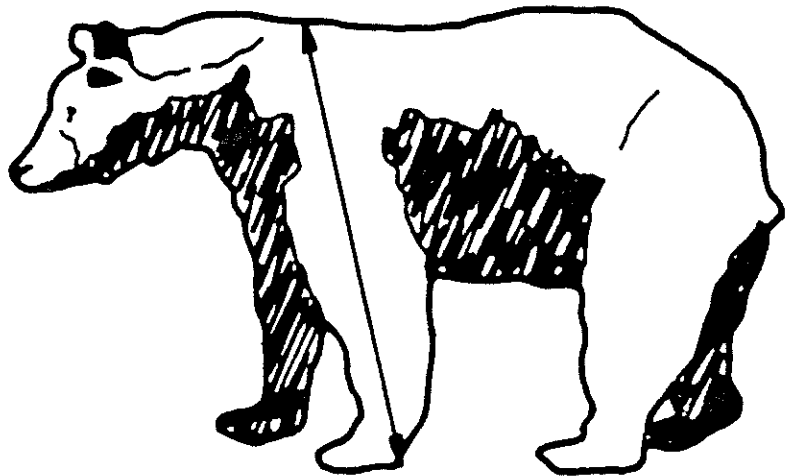
commercial truck scales if the empty trap is weighed either prior to capture or following the release. If scales or other equipment are unavailable, bear weights can be determined with a tape measure, and the weight-girth chart as described in Appendix IV.

Measurements

Bear research biologists normally gather an array of body measurements when they handle a bear. However, these measurements are time consuming to collect and most are not used in bear management. To reduce handling time, and to assure that useful biological data is gathered, the following measurements are recommended:

- Neck Circumference - Measure the distance around the neck at the mid-point between the shoulders and the head.
- Chest Circumference - Measure the distance around the chest immediately behind the shoulders (see Appendix IV for correlation with weight).
- Height at Shoulder - Measure from the top of the shoulder blade along the long bones of the front leg to the sole of the foot as if the bear were standing (Figure 29).

Figure 29. Measurement of height at shoulder. Illustration: Matt Alderson.



- Front Foot - Measure both total length and width, plus pad length and width, exclusive of claws as shown in Figure 30.
- Hind Foot - Measure both total length and width, plus pad length and width, exclusive of claws as shown in Figure 30.
- Total Length - Measure the distance from the tip of the tail to the tip of the nose along the backbone.
- Pectoral Nipples - (Females only) measure the length of both pectoral nipples from the breast to the tip, and the width at the base.

Other measurements can be taken if there is a specific need but the above measurements are important for several reasons. Body measurements are valuable for determining growth rates, which are indicative of habitat quality. Foot measurements can be used for determining if captured bears are the same animals as those making tracks around a capture site or elsewhere in the area. Nipple measurements can be used to determine if a female has produced cubs during her life, which when combined with age information, can indicate minimum breeding age. Minimum breeding age is influenced by habitat quality, and a determination of the age when females begin to produce young in an area can give valuable information on the reproductive potential of a bear population. To determine if a female has produced cubs convert nipple measurement to millimeters (Table 6). Multiply the length and width of each nipple and add these products to obtain a relative score (right L x W plus left L x W). From data collected in Montana, females that had produced cubs had scores in excess of 300, while those that had not scored less than 200 [J. Swenson, pers. comm., 1985]. Arizona bears should be similar.]

Table 6. Conversion of inches to millimeters.

Inches	Millimeters ¹	Inches	Millimeters
1/8	3.2	1 1/2	28.8
1/4	6.4	1 3/4	32.0
3/8	9.6	1 5/8	35.2
1/2	12.8	1 7/8	38.4
5/8	16.0	1 7/4	41.6
3/4	19.2	1 3/2	44.8
7/8	22.4	1 5/4	48.0
1	25.6	2	51.2

¹10 millimeters equals 1 centimeter

permanent teeth erupt during the bear's first year, and wear is variable. Because of these variables, only general ages can be assigned to each animal. Age determination of bears by tooth wear should only be done for general information purposes (e.g. to answer a hunter's question about the age of his bear). **Tooth wear should never be used as a substitute for cementum aging in any type of a management program.**

When aging bears by tooth wear, they can be divided into six categories: cubs (less than 1 year), yearlings (1-2 years), subadults (2-3 years), young adults (4-7 years), middle age adults (8-15 years), and old age adults (over 16 years). A guide for estimating ages of bears by tooth eruption and wear is given in Table 7.

Table 7
BLACK BEAR AGING GUIDE

(Applicable For Aging Bears During A Fall Hunt)

1. Do tips of upper canines show obvious wear?
 - Yes.....(see page 64 for 1A)
 - No.....(see page 64 for 1B)



Above - Canines with obvious wear - note tip of canine.

Below - Canines without obvious wear - note tip of canine.



Table 7 con't

2A. Do cusps on 1st upper incisor show wear?

Yes - subadult - 2-3/4 to 3-3/4

No (see page 66 for 3A)



Above - Cusps of 1st upper incisor with wear.

Below - Cusps of 1st upper incisor without wear.



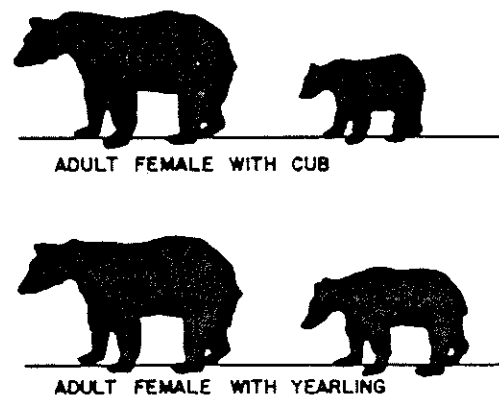
Presence of Cubs

When capturing bears, especially females that must be relocated, it is essential to determine if they have cubs so that family groups are not separated. Often this is obvious because the cubs will be observed, with their mother prior to or during capture. Sometimes, however, females will be captured and cubs will not be observed. If cubs are not observed, the nipples of the captured female should be examined. Subadult females will normally have small pink nipples, while breeding age females will have large brown nipples. Nipple measurements will verify if the female has produced cubs (see MEASUREMENTS).

If observations and measurements indicate a female to be breeding age, gently squeeze the nipples to see if milk is present. In Arizona this technique works well through July. After this time, milk production begins to cease and the cubs no longer rely on their mother for nourishment. Beyond July, the presence of cubs can usually only be determined by observation, but failure to observe cubs does not necessarily mean that a female does not have them. As cubs get older they become more wary of man and may stay out of sight. Therefore, in late summer check the capture site carefully for cubs before moving a breeding age female.

When making observations of cubs, also be careful not to classify yearlings as cubs. Black bear cubs remain with their mothers for 14 to 16 months before the family group disperses. In April and May it is not unusual to see females still accompanied by yearlings. Since few people observe bears, these small bears traveling with a female are often classified as cubs. (To assist in proper classification, the differences in size and weight of cubs and yearlings are shown in Table 8 on page 68 and a visual comparison of sizes is shown in Figure 31.)

Figure 31. Size difference between cubs and yearlings when observed with their mothers in April and May. (Also see Table 8). Illustration: Matt Alderson.



Biological Samples

The collection of biological specimens is much more involved and requires a great deal more equipment and planning than the collection of biological information. Before handling a bear be aware of the type of specimens that need to be collected so the proper equipment will be on site.

Normally, the only biological specimen collected from each bear will be a tooth. Sometimes, however, blood, tissue, or parasite samples may also be required, and occasionally entire carcasses will need to be examined by a pathologist. Diagnostic success will be dependent on the quality of the specimens submitted. To assist in the collection and preservation of biological specimens, the following procedures are suggested:

Tooth Collection

A tooth should be collected from every bear handled, living or dead. The first upper or lower premolar is preferred and the method of extracting this tooth is shown in detail in Appendix V. If dental tools as described in Appendix V are not available, use a very small screwdriver to loosen and elevate the tooth, and use a small pair of pliers to extract it. However, **never** attempt to pull a tooth with pliers until it has been completely loosened and rotated out of the socket. Excess pressure with pliers can break the crown off the tooth and the crown is unusable for determining age. Root fragments will also be left in the jaw which may cause infection.

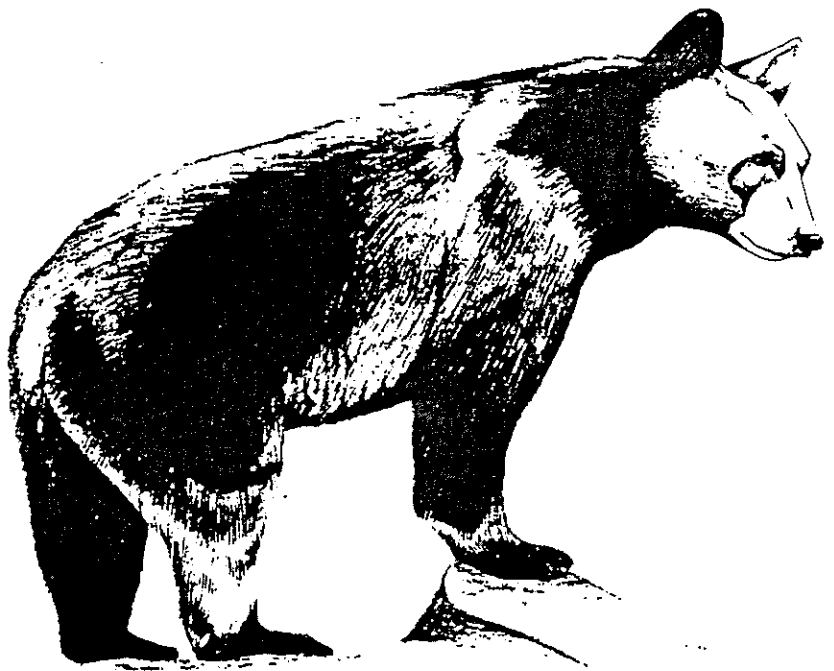
To avoid drying and cracking of the tooth once it has been extracted, it should be placed in a sealed envelope and submitted for processing within 2 weeks. Special tooth envelopes are available from the Department's Game Branch which have space for recording necessary information for each tooth. If the tooth has been taken from a hunter killed bear, a Mandatory Check-Out Card should also be completed and attached to the tooth envelope. If a special tooth envelope is unavailable, the tooth may be placed in any type of envelope. On the outside of the envelope record the following information:

Live Capture

1. Your name
2. Date of collection
3. Management unit
4. Sex
5. Species
6. Tag or other identification

Hunter Kill

1. Hunter's name
2. Date of kill
3. Management unit
4. Sex
5. Species
6. Tag or other identification numbers. numbers. (Attach envelope to mandatory check-out card.)



Collection Equipment

The type of equipment needed for blood collection will vary with the system used. Vacutainer systems consist of factory prepared vacuum tubes, special tube holders and double pointed needles which attach to the holder. Two types of vacuum tubes are needed: a red stopper type containing no anti-coagulant for serum samples, and a purple stopper type containing anti-coagulant for whole blood. Ten cubic centimeter vacuum tubes and 20 gauge, one inch needles are recommended for use on bears.

If a hand syringe system is used a 10 cc syringe with a 20 gauge, one inch needle is recommended. Small (1-3 cc) vials will also be needed for processing blood, and some of these small vials should contain an anti-coagulant such as Heparin, EDTA, or Sodium Citrate for preservation of whole blood. For blood smears, standard microscope slides work well.

Collection Site

The easiest site for collection of blood from bears is the femoral vein located on the hind leg (Fig. 33). To facilitate location of this vein, clip the hair over the vein or apply water to the site until the hair lies close to the skin. Apply pressure to the inside area of the leg just above the knee. Within a few seconds the femoral vein should become enlarged and can usually be seen. With very fat bears it may be difficult to locate the femoral, or any other vein.

is needed, a new site must be selected in the same vein nearer the head, or from the femoral vein on the other hind leg. One hematoma normally is not serious, but multiple hematomas can cause interference with blood flow and should be avoided. Once blood collection is completed, the needle should be removed from the vein and pressure applied to the puncture site until bleeding stops.

Preparation of Samples

After the blood has been drawn, preparation of samples should begin immediately or the blood will begin to clot. Preparation of samples collected with vacutainers is simplified because collection vials are available which already contain anti-coagulants. If the hand syringe technique is used, however, the blood must be transferred to smaller vials and an anti-coagulant added. When transferring whole blood, remove the needle from the syringe. This will reduce the rupturing of blood cells.

Vials containing blood for whole blood samples should be gently agitated for a few minutes to mix the anti-coagulant with the blood. Vials should then be labeled and placed upright where they will not roll around or tip over during transportation. Vials containing blood for serum samples should be allowed to stand for about one hour. The serum should then be separated from the blood clot and placed in small (1-3 cc) labeled containers prior to transportation. This separation is best done with a pipet, but a small hand syringe can be used. Three cubic centimeters of whole blood will usually yield 1 cc of serum.





Figure 34. Technique for making blood smear. (a) Dip edge of microscope slide into drop of blood.



(b) Draw bloody edge of slide over another microscope slide to create a thin smear.

Collection Procedures

Observations are vital to any necropsy. Often the presence of blood or appearance of tissue may be valuable in determining cause of death. This section deals with general necropsy procedures and things to look for when working on an animal. More detailed information on observing abnormalities and determining the health of an animal are presented in this field guide under "Indications of Health of Prey." It is suggested this section be reviewed before beginning a necropsy.

Always wear gloves when handling an animal that has died from unknown causes. Start the necropsy by first examining the exterior of the carcass. Does the animal appear to be in good or poor condition (see GENERAL BODY CONDITION). Next, examine the skin and pelage. Look for matted hair, dried blood, or discharges from the eyes, nose, ears, or anus. If punctures or other wounds are found, carefully skin around these areas and examine the underside of the skin. Note any hemorrhaging or other abnormalities. If predation is suspected, measure the size and distance between puncture wounds for comparison with carnivore canine measurements (see INSPECTION OF THE CARCASS).

Next, open the animal from the anus through the brisket. Also, open the skin along the throat so the trachea and esophagus can be observed. Note and record the presence and color of any fluid in the body cavity, and then begin to examine and remove various organs. If an ice chest is available and samples can be quickly transported, it is best to remove the entire viscera in one piece. To do this, sever the trachea and esophagus at the head and tie them closed with string. Remove the entire viscera, and place it in the ice chest. Then, cut off the head in a way that will not damage the skull, and place it in the ice chest with the viscera and transport immediately.

If the entire viscera cannot be handled intact, small samples of each organ (1 x 1 x 1/4 in.) should be collected and preserved. Samples to be refrigerated can be placed in plastic sandwich bags, but specimens to be preserved in 10% formalin should be placed in Whirlpac bags or jars. It is also advisable to place all Whirlpac bags in a jar as soon as possible because, even though they are leak proof, they may become punctured during storage or transportation. Samples collected should include heart, lung, liver, spleen, kidney, brain, and a piece of the small and large intestines. If chemical or toxic agents are suspected, also submit a sample of the stomach contents. In addition to these samples, collect any tissues having obvious abnormalities. If possible, cut out all of the abnormal looking tissue plus some adjacent normal tissue. If this is not possible, obtain samples of both normal and abnormal tissue, and take a picture of the abnormality for the pathologist.



Figure 35. Loss of facial hair due to mite infestation.



Predation Problems

Bear predation on healthy animals of both wild and domestic species has been documented in Arizona. Unfortunately, bears also kill animals that may be dying from other causes such as starvation or disease, and they scavenge carcasses of animals killed by other predators, or that have died of natural causes. This killing and scavenging behavior often makes it difficult to determine the actual cause of death and bears are sometimes blamed for kills they did not make.

Cause of death to an animal can be divided into three categories; predation, pseudo-predation, and death from other causes. Predation is when a bear or other predator actually kills a healthy animal. Pseudo-predation is when a bear or other predator kills an animal that has been weakened from some other cause, and chances of its survival would have been questionable had the predation not occurred. Losses from other causes include death from accidental injury, disease, poisonous plants, or chemicals, still-births, starvation, gunshot wounds and other non-predator related deaths. To accurately determine the cause of death the following must first be determined:

1. Was the cause of death bear related or from other causes?
2. If the cause of death was bear related, was the prey healthy or sick?
3. Was the cause of death due to another predator and if so, which predator?
4. Was the cause of death due to disease and if so, which disease?
5. Was the cause of death due to poisonous plants and if so, which plants?

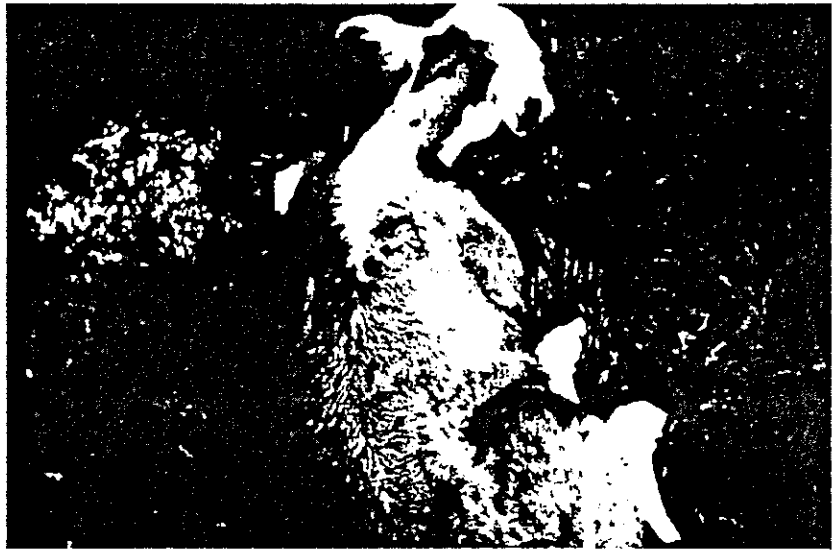


Figure 36. Calf which survived a black bear attack - note bites on the back.
Photo: Lawrence Roy and Michael Dorrance.

Sign Around the Carcass

After examining the kill site, look for sign around the carcass. When compared to other predator sign bear sign is usually obvious due to the large size of their tracks and scats. **The presence of bear sign near a carcass, however, does not provide positive proof that a bear killed the animal.** Another predator may have made the kill, or the bear may simply have been feeding on an animal that died from other causes.

Examine the area around the carcass for all types of sign. Look at all tracks in the vicinity; several species of animals may be scavenging from the same carcass. Also, look for scats of various predators. Bear scats will usually be found in the vicinity of the animal on which they are feeding. If these scats contain meat, they will normally be black in color and runny in consistency but will seldom contain hair from the dead species. Black bears normally avoid eating hair. If the scats contain primarily maggots it may cast doubt on predation. Bears that kill calves, sheep, and other similarly sized animals will normally eat the entire carcass before maggot infestations progress to a point where they appear in the scats. Bear scats containing many maggots often indicate that a bear has been feeding on maggots from an older carcass that it has scavenged rather than killed. If, however, only bear sign is found, a person can be sure a bear was involved, but further investigation will be necessary to determine if the bear killed the animal or simply was scavenging from the carcass.



Figure 37 (above). Udder eaten from a ewe killed by a black bear. Photo: Pat Ryan.

Figure 38 (center). Bear killed fawn on which bear began feeding on the back and shoulders. Photo: Mike Schlegel.

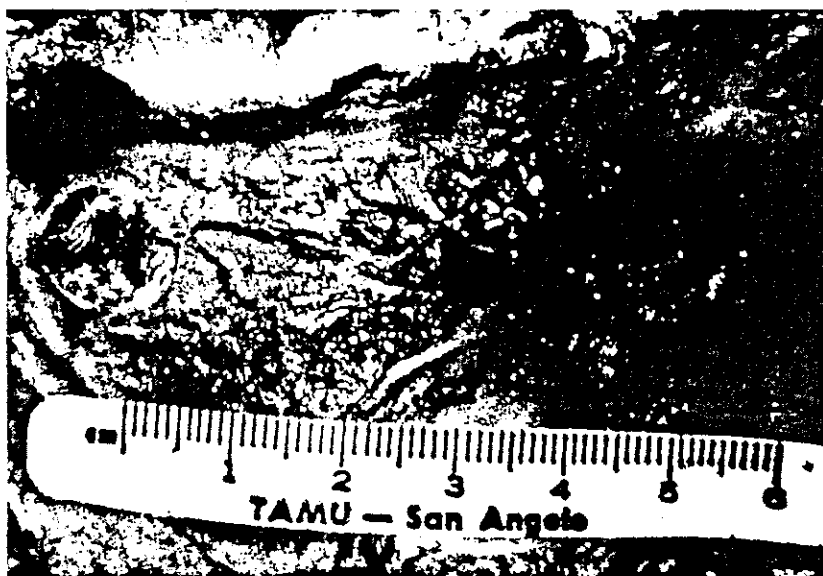
Figure 39 (bottom). Bear killed elk calf with skin inverted over head and legs.





Figure 40. Lamb skin showing tooth punctures and hemorrhaging which indicates animal was alive when attacked. Photo: Dale Wade.

Figure 41. Measuring tooth punctures on the inside of a calf hide. Photo: Dale Wade.



Indications of Health of Prey

Once a thorough investigation of the kill site and the carcass has been made and all the evidence examined, it should be possible to determine if an animal was a predator kill or died from other causes. If it was a predator kill, it should also be possible to tell if a bear, was the predator. If it is determined that the animal was killed by a bear, the next step is to decide if the kill was predation on a healthy animal or pseudo-predation on an unhealthy animal. To determine if an animal was healthy at the time of death examine the following:

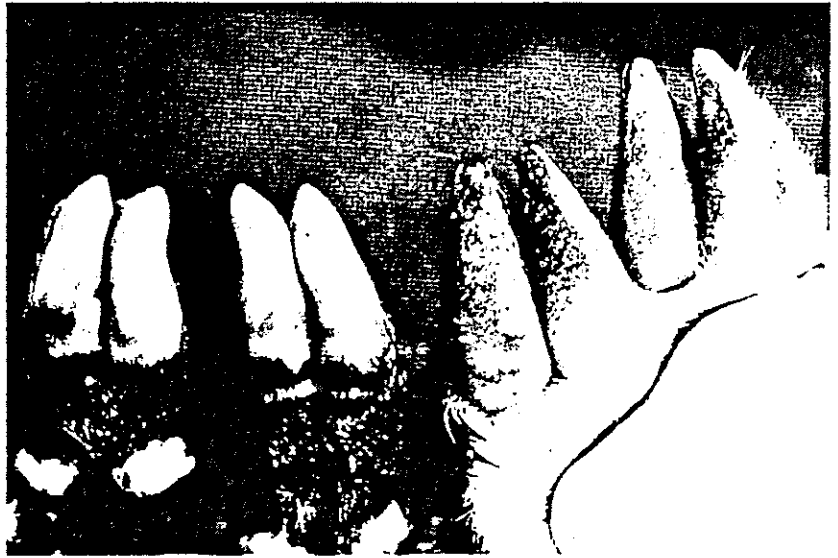


Figure 42. Indication that a newborn did not walk. A soft membrane still covers the hooves of a stillborn goat on the left but have been worn away on the hooves of an 18 hour old lamb's hooves on the right. Photo: Dale Wade.

Old and Newborn Animals

Very old and very young animals are less likely to survive such things as adverse weather, poor nutrition, or disease. Very old animals are usually obvious due to the excessive wear on their teeth. Poor condition in these animals can be noted by lack of visceral fat and red gelatinous bone marrow.

Very young animals present more of a problem. This is especially true when trying to separate healthy newborns from unhealthy young or stillborns. Pregnancy diseases or difficult births may cause offspring to be stillborn, or to be born in a very weakened condition. Healthy young animals will have the following characteristics:

1. Young born alive will have a distinct blood clot at the end of the navel; stillborn young will not.
2. Lungs of animals born alive are light pink in color and will float in water; stillborn young have dark red-purple lungs that do not float.
3. The soft membrane covering the soles of the hooves wear away when a newborn begins to walk. Wet, soft grass may slow initial wear, but no wear indicates the newborn never got to its feet (Fig. 42).
4. The presence of milk in the stomach indicates the newborn has fed. The absence of milk in the stomach of an animal during the first few weeks of life indicates poor nutrition.
5. Firm white fat deposits around the heart indicate health. Lack of heart fat indicates poor health.



A



B

Figure 43. 'Bear-proof' garbage container: (A) Container in use. (B) Container ready for emptying. Photo: Glacier National Park.

and told that if they feel threatened they should leave the area. Campers that stay should be told to store their food in places where bears cannot get to it, (e.g. by hanging it in trees or putting it inside their vehicle). Storing food in tents, pick-up truck beds, or in ice chests should be discouraged and offenders should be asked to leave.

Sanitation workers responsible for garbage collection should be asked to remove garbage on at least a daily basis while the bear is in the area. Collection times should be late in the day so little or no garbage remains in the campground at night. "Bear-proof" garbage containers should also be installed to prevent bears from obtaining food that is not removed (Fig. 43). (Plans for a "bear-proof" garbage container are included in the back of this field guide). If regular garbage removal or installation of "bear proof" containers is not immediately possible, the campground should be closed until proper garbage containment can be achieved.

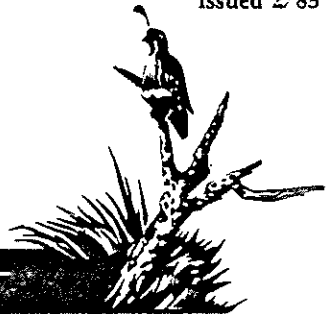
For new housing areas, meetings should be held with planning and zoning committees and with home developers. Zoning laws requiring "bear-proof" garbage containers, along with consolidation of garbage from single family cans to larger containers serving several homes, should be encouraged. Where garbage collection is provided, increases in scheduled pick-ups should also be planned to reduce garbage accumulation during peak bear problem times. All of these steps will help reduce food availability and they are essential in solving any residential bear problem.

- Arizona. M.S. Thesis. Ariz. State Univ., Tempe. 50 pp.
- Murie, O. J. 1954. A field guide to animal tracks. The Riverside Press. Cambridge, Mass. 374pp.
- Roy, L. D. and M. J. Dorrace. 1976. Methods of investigating predation of domestic livestock. Alberta Agri. Plant Industry Lab. Edmonton. 54pp.
- Saver, P. R. 1966. Determining sex of black bears from the size of the lower canine teeth. New York Fish and Game J. 13(2) 140-145.
- Schmutz, E. M., B. N. Freeman, R. E. Reed. 1968. Livestock-poisoning plants of Arizona. The Univ. Ariz. Press, Tucson. 176pp.
- Shaw, H. G. 1983. Mountain Lion Field Guide. Ariz. Game and Fish Dep. Spec. Rep. No. 9. 38pp.
- Strathern, S. M., J. S. Lotimer, and G. B. Kolensky. 1984. An expanding break-away radio collar for black bears. J. Wildl. Manage., 48(3) 939-942.
- Waddell, T. E. 1984. Exploitation of two subpopulations of black bears in an isolated mountain range. J. Wildl. Manage., 48(3) 933-938.
- _____, and D. E. Brown. 1984. Weights and color of black bears in the Pinaleno Mountains, Arizona. J. Mamm., 65(2) 350-351.
- Wade, D. A., and J. E. Bowns. 1980. Procedures for evaluating predation on livestock and wildlife Texas Agri. Ext. Ser. Bul. 1429. Texas A&M Univ. College Station, Texas. 42pp.
- Woolsey, N. G. 1985. Coyote Field Guide. Ariz. Game and Fish Dep. Spec. Rep. No. 15. 39pp.

Appendix I

Wildlife Digest

Abstract 14
Issued 2/83



Arizona Game And Fish Department

IMMOBILIZATION OF CULVERT-TRAPPED BLACK BEARS WITH ALPHA-CHLORALOSE

Albert L. LeCount, Research Biologist

Arizona Game and Fish Department



A Research Abstract, Contribution of Federal Aid Project W-78-R

Table 1. Pen test results of orally administered alpha-chloralose on a 16 month old, 105 pound female black bear.

DATE	BAIT	DRUG DOSAGE (GRAMS)	TIME TO 1st REACTION (MINUTES)	IMMOBILIZED	TIME TO HANDLING (MINUTES)	TIME TO RECOVERY (HOURS)	HEART RATE (BPM)	RESPIRATION PER MINUTE
4/10/75	DOG FOOD	1	40	NO	—	2	—	—
4/13/75	"	2	25	NO	—	5	—	—
4/16/75	"	3	18	YES	43	17	55	9
4/20/75	"	4	15	YES	55	23	56	11
4/24/75	HONEY	1	22	NO	—	2	—	—
4/28/75	"	2	30	NO	—	6	—	—
4/30/75	"	3	19	YES	45	18	53	10
5/4/75	"	4	12	YES	47	22	51	9

The first observed reaction by the bear to alpha-chloralose was some loss of coordination, especially in the hind quarters. With dosages of 1g/100 lbs. and 1g/50 lbs. the bear would occasionally become incoordinated and lie down. Upon human approach, however, it would regain its feet and again become active. No bears administered dosages of 1g/100 lbs. or 1g/50 lbs. could be safely handled without additional mechanical restraint.

In tests where 1g/33 lbs. and 1g/25 lbs. of alpha-chloralose were administered, an acute central nervous system depression occurred. The bear would lose coordination, lie down, and gradually go to sleep. Complete sedation took approximately 40 to 55 minutes (Table 1). At this time the bear could be safely removed from the culvert-trap without additional restraint.

Recovery from the effects of alpha-chloralose varied with the amount of drug administered, the lighter the dose the quicker the recovery. In tests where 1g/100 lbs. of drug was administered, the bear was totally recovered within 2 hours, while in tests where 1g/25 lbs. was given, recovery took over 20 hours (Table 1). During recovery from higher dosage levels the bear slowly awoke and regained head control. It would then gradually regain control of its front legs and shoulders and assume a sitting position. Finally, it would regain coordination of its hind quarters and begin to move about in a normal manner.

The amount of alpha-chloralose needed to chemically restrain the subject black bear (1g/33 lbs.) was much lower than the 1g/5.0 lbs. considered to be a minimal dosage level by Stafford and Williams (1968) and even dosages of 1g/25 lbs. did not appear to be excessive since they did not reduce the bear's heart rate from a normal summer sleeping

rate of approximately 5 bpm. (Folk et al. 1972) (Table 1). The latter dosage, however, did extend the bear's recovery time approximately 5 hours while not significantly reducing the time elapsed before the bear could be handled (Table 1).

Based on the results of these tests, a dosage level of 1g/33 lbs. was selected as optimal for handling culvert-trapped bears. Lighter dosages were ineffective and higher dosages only extended the time the bear was under the effects of the drug.

FIELD TESTS

Field testing was conducted on 7 bears culvert-trapped by Arizona Wildlife Managers from October 1980 through July 1982. These bears were all males and varied in age from 9 months to 3 years (Table 2). Each bear's weight was estimated at the time of capture and the baited drug dosage was based on that weight. The proper dosage of alpha-chloralose (1g/33 lbs.) was mixed with approximately 4 ounces of honey in a small aluminum container and presented to the bear by sliding the container through the door of the culvert-trap.

In most instances the bait was immediately consumed. However, one 3 year old male would not eat the honey containing the bait, even though the mixture was left in the culvert-trap for 4 hour. This particular bear had been baited into the trap with watermelon and showed more interest in the watermelon which remained in the trap. Therefore, the honey bait was removed and replaced with a drugged watermelon bait which was immediately consumed.

MANAGEMENT APPLICATION

Wildlife managers who wish to use alpha-chloralose on culvert-trapped bears should have the following items on hand before they set their culvert-trap: aluminum foil, honey (in a plastic container), and alpha-chloralose in vials of 1g each (Figure 1).

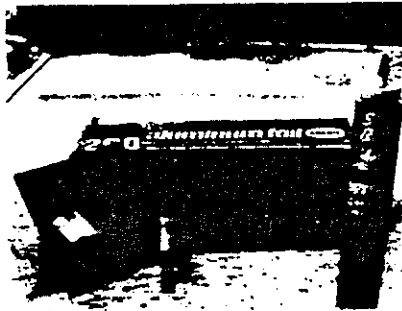


Figure 1. To administer alpha-chloralose to culvert-trapped bears you need the following materials: aluminum foil, honey, alpha-chloralose.

The bear should be denied food as much as possible before the drugged bait is administered by using only enough bait to attract the bear into the trap but not enough to completely fill its stomach.

After the bear is captured it should be moved to a quiet location away from human activity. The bear's weight should then be estimated. Most culvert-trapped bears are 2 to 3-year old males which, in Arizona, weigh between 100 and 150 pounds (Table 2). Occasionally, however, adult bears are captured. In Arizona, adult females average 150 pounds with the heaviest weighing approximately 200 pounds, and adult males average about 275 pounds (LeCount Unpub. data). Therefore, most culvert-trapped bears in Arizona, except adult males, which are rarely captured in culvert-traps, can be successfully immobilized with 3 to 6 grams of alpha-chloralose.

After the bear's weight has been estimated, the bait to be mixed with the drug should be tested for acceptance. Honey is the recommended bait because most bears will readily eat it, and if purchased in a plastic bottle, honey can be carried and stored for long periods of time. To determine if a bear is willing to eat honey, simply put a small amount on a stick and offer it to the bear through the door of the culvert-trap. Back away from the trap so the bear is not disturbed by your presence. If the bear immediately eats the honey, it is ready for drugging. If not, wait 10 to 15 minutes. If it still shows no interest in honey, then try other baits until you find one he is willing to eat.

If the bear refuses all food, lack of water in the culvert-trap may have caused the bear to become too dehydrated to eat. Offer the bear water; if it drinks, repeat the pre-baiting procedure. If the bear will still not eat after drinking, it is probably not hungry. In this case, leave the bear alone in a quiet location for

several hours and then repeat the pre-baiting procedure. Continue this pattern until the pre-bait is eaten. Never offer a drugged bait to a bear until you are relatively sure that the bait will be entirely eaten. Otherwise, the bear might consume only a portion of the bait and receive an inadequate dose.

Once the bear has shown interest in eating the pre-bait the drugged bait should be prepared. Fashion a small container from aluminum foil which will fit through or under the door of the culvert-trap (Figure 2). Put about 4 ounces of honey (or other bait) into this container (Figure 3) and then mix in the proper amount of alpha-chloralose. Pre-weighed 1g dosages of the drug stored in separate vials eliminate the need for carrying delicate scales to the capture site to weigh the drug (Figure 4).

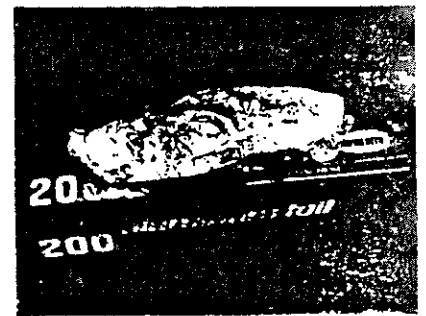


Figure 2. Fashion an aluminum foil container for bait.

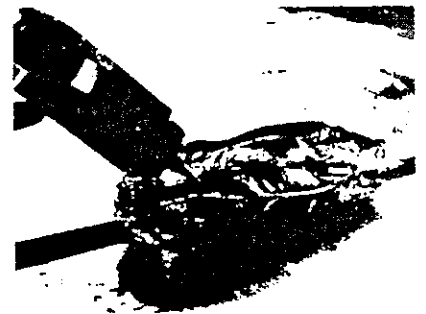


Figure 3. Mix bait and alpha-chloralose in aluminum foil container.

LITERATURE CITED

- Austin, D.H., and J.H. Peoples. 1967. Capturing hogs with alpha-chloralose. *Proc. Annu. Conf. Southeastern Assoc. Game and Fish Comm.* 21:201-205.
- Clark, W., D.A. Jessup, and A. Adams. 1979. Animal restraint handbook. CA Fish and Game, Sacramento, CA. 101pp.
- Crider, E.D., V.D. Stotts, and J. C. McDaniel. 1968. Diazepam and alpha-chloralose mixtures to capture waterfowl. *Proc. Annu. Conf. Southeastern Assoc. Game and Fish Comm.* 22:101-109.
- Day, G.I. 1969. Use of oral drugs for capturing game animals. *F.A. Prog. Rep.* W78-R-14. 7pp.
- Folk, E.G., Jr., M.A. Folk, and J.J. Minor. 1972. Physiological condition of three species of bears in winter dens. In S. Herrero ed. *Bears - Their Biology and Management*. Morges, IUCN New Series. 23:107-125.
- Fuller, A. 1976. Capturing depredating javelina. *F.A. Prog. Rep.* W53-R-26.
- Hofman, D.E., and H. Weaver. 1980. Immobilization of captive mallards and pintails with alpha-chloralose. *Wildl. Soc. Bull.* 8:156-158.
- LeCount, A.L., Editor. 1979. *Proceeding First Western Black Bear Workshop*. AZ Game and Fish Dept. Phoenix, AZ. 339pp.
- Pomeroy, D.E., and M.H. Woodford. 1976. Drug immobilization of Marabou storks. *J. Wildl. Mgt.* 40:177-179.
- Schafer, E.W., and D.J. Cunningham. 1972. An evaluation of 148 compounds as avian immobilizing agents. U.S. Dept. Inter. Bur. Sport Fish and Wildl., Spec. Rep. Wildl. 150. 21pp.
- Stafford, S.K., and L.E. Williams, Jr. 1968. Data on capturing black bears with alpha-chloralose. *Proc. Annu. Conf. Southeastern Assoc. Game and Fish Comm.* 22:161-165.
- Williams, L.E., Jr. 1966. Capturing wild turkeys with alpha-chloralose. *J. Wildl. Mgt.* 30:50-56.

Appendix III

Wildlife Handling Forms

Check List for Suspected Predator Kill Forms

STATE OF ARIZONA

WILDLIFE HANDLING FORM

I. CAPTURE DATA

A. AGF Region Mgmt Unit Species I.D.# B. Sex M F U Field Age Cementum Age C. Quad # EWUTM NSUTM D. Observer Agency Division E. Date M. Time Location
Mo Da YrF. Recapture Y N Method :G. Release site: Quad # EWUTM NSUTM

II. TAGGING DATA (ear tags, leg bands, collars, etc.)

	Old	New	Symbol or Number	Manu- facturer	(P-plastic) (M-metal) Material	(tag, streamer tattoo, collar) Mark	L or R	Body Location	Color
1.									
2.									
3.									
4.									
5.									

Transmitter (collar #) Mfg.
I.D. AGF # Serial # Freq. Other:

III. DRUG DATA

	Dosage (total mg)	Site Injected	Response
Drug (1)			
(2)			
Antidote			
Antibiotic			
Other:			

IV. TIME DATA

	Begin	Chase	Inject	Inject	Response	Immobili- zed	Antidote	Release
M. Time								

Other:

Form

AZ Game & Fish Dept. 3/85

Return Copy To:
Game Branch
Arizona Game & Fish Dept.
2222 W. Greenway Rd.
Phoenix, AZ 85023

STATE OF ARIZONA

WILDLIFE HANDLING FORM

I. CAPTURE DATA

A. AGF Region Mgmt Unit Species I.D.#

B. Sex M F U Field Age Cementum Age

C. Quad # EWUTM NSUTM

D. Observer Agency Division

E. Date Mo Da Yr M. Time Location

F. Recapture Y N Method

G. Release site: Quad # EWUTM NSUTM

II. TAGGING DATA (ear tags, leg bands, collars, etc.)

	Old	New	Symbol or Number	Manu- facturer	(P-plastic) (M-metal) Material	(tag, streamer tattoo, collar) Mark	L or R	Body Location	Color
1.									
2.									
3.									
4.									
5.									

Transmitter (collar #) Mfg.

I.D. - AGF # Serial # Freq.

Other:

III. DRUG DATA

	Dosage (total mg)	Site Injected	Response
Drug (1)			
(2)			
Antidote			
Antibiotic			
Other:			

IV. TIME DATA

	Begin	Chase	Inject	Inject	Response	Immobili- zed	Antidote	Release
M. Time								

Other:

Form

AZ Game & Fish Dept. 3/85

Return Copy To:
Game Branch
Arizona Game & Fish Dept.
2222 W. Greenway Rd.
Phoenix, AZ 85023

STATE OF ARIZONA

WILDLIFE HANDLING FORM

I. CAPTURE DATA

A. AGF Region Mgmt Unit Species I.D.#

B. Sex M F U Field Age Cementum Age

C. Quad # EWUTM NSUTM

D. Observer Agency Division

E. Date M. Time Location

Mo Da Yr

F. Recapture Y N Method :

G. Release site: Quad # EWUTM NSUTM

II. TAGGING DATA (ear tags, leg bands, collars, etc.)

	Old	New	Symbol or Number	Manu- facturer	(P-plastic) (M-metal) Material	(tag, streamer tattoo, collar) Mark	L or R	Body Location	Color
1.									
2.									
3.									
4.									
5.									

Transmitter (collar #) Mfg.

I.D. AGF # Serial # Freq.

Other:

III. DRUG DATA

	Dosage (total mg)	Site Injected	Response
Drug (1)			
(2)			
Antidote			
Antibiotic			
Other:			

IV. TIME DATA

	Begin	Chase	Inject	Inject	Response	Immobili- zed	Antidote	Release
M. Time								

Other:

Form

AZ Game & Fish Dept 3/85

Return Copy To:
Game Branch
Arizona Game & Fish Dept.
2222 W. Greenway Rd.
Phoenix, AZ 85023

CHECK LIST FOR SUSPECTED PREDATOR KILL

Date Inspected: _____ How Located: found by AGF personnel,
reported by rancher, forester, hunter, other?
Note which.

Species: _____

Location: _____

Estimated time since death: _____

Kill site description:

Slope direction: _____ Percent: _____

Cover vegetation type: _____

Tree or shrub species where kill is stashed: _____

General Appearance:

Drag marks present: _____ How far dragged: _____

Predator tracks present? Species: _____ Msmts: _____

Kill covered: _____ Type of debris: _____

Has kill been moved: _____ How many times: _____

No. of burial sites: _____

Carcass characteristics

Carcass fed upon: _____

Percent consumed: _____

Position of carcass. On side, extended, curled up,

Other: _____

Apparent point of first feeding on carcass: rib cage, hind
quarters, front quarters, other (describe) _____

Use of entrails: parts missing, parts present, percent of
entrails consumed: _____

Use of muscle and fat: hind quarters, front quarters, neck
etc. Percent of each portion: _____

Signs of predator damage on carcass:

Tooth marks — location: _____

Msmts (*distance between canines*): _____

Claw marks — location: _____

Blood on ground or carcass; describe: _____

Signs of subcutaneous or internal hemorrhage; location and
description: _____

Probable means of killing:

Broken neck or vertebrae: _____

choked: _____ other, describe: _____

Signs of struggle or chase at kill site

Investigation assessment of predator involvement:

Certain: _____, unlikely: _____, highly probable: _____

predator not cause of death: _____, possible: _____

CHECK LIST FOR SUSPECTED PREDATOR KILL

Date Inspected: _____ How Located: found by AGF personnel,
reported by rancher, forester, hunter, other?
Note which.

Species: _____

Location _____

Estimated time since death _____

Kill site description: _____

Slope direction _____ Percent _____

Cover vegetation type _____

Tree or shrub species where kill is stashed _____

General Appearance:

Drag marks present _____ How far dragged _____

Predator tracks present? Species _____ Msmts _____

Kill covered _____ Type of debris _____

Has kill been moved _____ How many times _____

No. of burial sites _____

Carcass characteristics

Carcass fed upon _____

Percent consumed _____

Position of carcass. On side, extended, curled up,

Other _____

Apparent point of first feeding on carcass: rib cage, hind

quarters, front quarters, other (describe) _____

Use of entrails: parts missing, parts present, percent of

entrails consumed _____

Use of muscle and fat: hind quarters, front quarters, neck

etc. Percent of each portion _____

Signs of predator damage on carcass:

Tooth marks — location _____

Msmts (*distance between canines*) _____

Claw marks — location _____

Blood on ground or carcass; describe _____

Signs of subcutaneous or internal hemorrhage; location and

description _____

Probable means of killing:

Broken neck or vertebrae _____

choked _____ other, describe _____

Signs of struggle or chase at kill site _____

Investigation assessment of predator involvement:

Certain _____, unlikely _____, highly probable _____

predator not cause of death _____, possible _____

CHECK LIST FOR SUSPECTED PREDATOR KILL

Date Inspected: _____ How Located: found by AGF personnel,
reported by rancher, forester, hunter, other?
Note which.

Species: _____

Location: _____

Estimated time since death: _____

Kill site description:

Slope direction: _____ Percent: _____

Cover vegetation type: _____

Tree or shrub species where kill is stashed: _____

General Appearance:

Drag marks present: _____ How far dragged: _____

Predator tracks present? Species: _____ Msmts: _____

Kill covered: _____ Type of debris: _____

Has kill been moved: _____ How many times: _____

No. of burial sites: _____

Carcass characteristics

Carcass fed upon: _____

Percent consumed: _____

Position of carcass. On side, extended, curled up,

Other: _____

Apparent point of first feeding on carcass: rib cage, hind
quarters, front quarters, other (describe) _____

Use of entrails: parts missing, parts present, percent of
entrails consumed: _____

Use of muscle and fat: hind quarters, front quarters, neck
etc. Percent of each portion: _____

Signs of predator damage on carcass:

Tooth marks — location: _____

Msmts (*distance between canines*): _____

Claw marks — location: _____

Blood on ground or carcass; describe: _____

Signs of subcutaneous or internal hemorrhage; location and
description: _____

Probable means of killing:

Broken neck or vertebrae: _____

choked: _____ other, describe: _____

Signs of struggle or chase at kill site: _____

Investigation assessment of predator involvement:

Certain: _____, unlikely: _____, highly probable: _____,

predator not cause of death: _____, possible: _____

Appendix IV

Wildlife Digest

Abstract 1
Issued 2/7

Arizona Game And Fish Department



USING CHEST CIRCUMFERENCE TO DETERMINE BEAR WEIGHT

Albert LeCount, Research Biologist

Arizona Game and Fish Department

The weights of black bears are probably overestimated more often than the weights of any other big game species in Arizona. Even wildlife workers and hunters handle too few of these animals to become proficient at weight estimation. Stories and legends have also made bears much larger in most peoples' minds than they actually are. Black bears in Arizona are often estimated to weigh from 200 to 400 pounds, yet adult females actually average about 150 pounds and the adult males about 275 pounds.

Cattle and hog producers have used weight tapes for years to estimate the live weight of animals being fattened for market. These tapes work on the principle that a relationship exists between chest circumference and whole body weight. In other words, as an animal gains or loses weight, the distance around the chest changes proportionately. Similar relationships have also been described for several wildlife species including one by Payne (J. Wildl. Manage. 40(1):167-169, 1976) for black bears in Newfoundland.

As part of Arizona's black bear study, chest circumference and live weights have been taken on more than 50 different bears. A close functional relationship exists between chest circumference and weight of adult bears making it possible for a person to estimate the live weight of a bear simply by measuring the distance around the chest. This measurement can be taken on both immobilized live animals, as well as on field dressed animals as long as the brisket has not been split or the hide removed.

In order to determine the weight of a bear with this technique the chest circumference measurement should be taken around the chest immediately behind the shoulders with either a steel or cloth tape measure (Fig. 1). Position of the animal and breathing movement are not of prime importance. The main precaution is to be sure the tape is snug, but not tight, when the measurement is taken. After the chest circumference has been measured in inches, locate this girth length on the horizontal axis of the graph (Fig. 2). Move vertically to the point of intersection with the curved line. This point projected onto the vertical axis estimates live weight. In most instances this estimate will be within 20 pounds of the actual weight.

With this system it is no longer necessary to guess at the weight of a bear, or try to carry bulky scales into the field to obtain weights. Instead, this one simple measurement can be taken and a relatively accurate weight can be determined for any bear over one year of age.

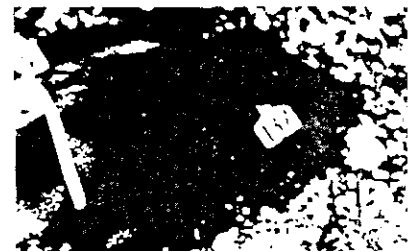


Fig. 1. Placement of tape for girth measurement.

Appendix V

Wildlife Digest

Abstract 9
Issued 4/75

Arizona Game And Fish Department



A Game Management Abstract

A TECHNIQUE FOR EXTRACTING A BEAR'S FIRST PREMOLAR

Thomas E. Waddell

Arizona Game and Fish Department

Numerous bears are captured throughout the state by Wildlife Managers and Research Biologists each year. As much biological information as possible is taken from each animal. Individual ages of bears handled are of prime importance and can only be ascertained by tooth sectioning, which necessitates removal of a tooth. As the portion sectioned is the root of the tooth, caution should be exercised to insure complete extraction. A broken tooth can cause complications.

Premolar one (PM1) of the lower jaw was selected due to the relative ease of removing a single rooted tooth. The absence of this tooth is virtually unnoticed by sportsmen and does not detract from the skull, therefore, preserving the integrity of a trophy.

Preliminary attempts at extraction often resulted in a broken tooth, due to lack of a suitable technique. A dried jaw was taken by Wildlife Specialist Bob Hernbrode to Dr. William F. Neis, D.D.S. of Tucson for X-rays and suggestions for tools and techniques needed for successful extraction. A photograph of the X-ray and a suggested removal technique furnished by Dr. Neis was returned. With some additions, a tooth was extracted intact from an anesthetized live bear by Dr. Marden Alder, D.D.S. of Safford. Whole teeth have been successfully

extracted from live bears, hunter kills and dried skulls in this simple, expedient manner as described below.

Tools required are a 301 Cleve dent straight elevator and a pedodontic anterior incisor forceps (Figure 1).



Figure 1. Tools required for extraction are the elevator on the left and two forceps on the right. The forceps in the center are the easiest to handle.

Grip the tooth as deeply as possible by pushing down around the gum with the forceps. Hold the tooth lightly but firmly. Rotate the tooth slightly clockwise and counter-clockwise while working it back towards molars (Figure 6).

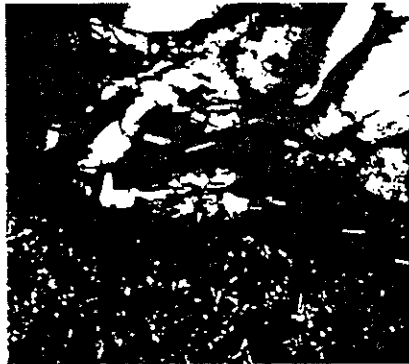


Figure 6. Rotate tooth slightly clockwise and counter-clockwise while pulling it toward the molars.

Do not attempt to lift tooth out until tooth is nearly perpendicular to the gum line (Figures 7, 8 and 9).

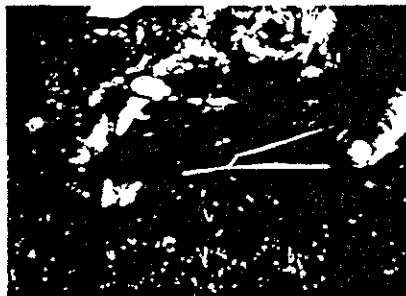


Figure 7. Do not attempt to lift the tooth out until it is nearly perpendicular to the gum line.



Figure 8. Extraction is complete here. Note how much of PMI is gripped by forceps.



Figure 9. This photo shows relative size of PMI and its approximate position in relation to jaw and adjoining canine.

At no point in this technique should much force be used. The greatest opportunity to break a tooth lies in use of the forceps. Premature attempts to "pull" the tooth increases pressure of the grip of the forceps on the tooth and will crush the tooth or at best break it off. With a little experience the entire operation should take no more than three minutes to complete.

Drugs: (also see specific drug by name)

delivery systems, 32, 36, 38, 47, 48;
dosages, 25, 26, 27, 28, 40;
reactions to, 24, 26, 28;
recommended, 24, 25, 26, 28, 48;
records, 45;
recovery from, 26, 28, 43;
safety, 43, 44, 45;
second injection, 26, 40;
storage, 26, 43.

Drugging. *see* Immobilization

Ears: 45, 77;
notches, 57;
size, 30;
space between, 30;
tag placement, 51, 52, 53.

Eyes:
also see *Blindfolds*, 26, 42, 45, 77.

Fat:
bears, 40, 62;
other animals, 88, 89.

Feeding behavior. *see* Behavior

Feet:
bears, 4, 61;
other animals, 4, 89.

Females, 6, 30, 31, 52, 61, 67.

Femoral vein, 71, 73.

Food, 9, 10, 17, 81, 83, 84.

Forms. *see* Records

Garbage:
containment, 90, 91, 92, 93;
problems with, 90, 92;
removal, 21, 90, 91, 92, 93.

Guns (Cap-Chur):
pistol, 32, 47;
rifle, 32, 47.

Hair, 10, 15, 62, 88.

Head characteristics, 30.

Health:
bears, 62, 76;
other animals, 84, 87, 88, 89.

Hemmoraging in prey, 84.

Immobilization, 18, 24, 47.

Injection sites, 40.

Jab-stick:
construction, 36;
use, 37, 40, 48.

Ketamine-Rompun (ketamine hydrochloride-xylazine hydrochloride):

Ketch poles, 24, 47.

Laboratories, 74, 76, 78, 88, 105.

Lactation, 67.

Logs, 10.

Lungs:
abnormal, 88, 89;
injection of material, 43, 46;
normal, 88, 89.

M-50-50 (Diprenorphine):
bear dosages, 28;
use on humans, 44.

M-99 (Etorphine), 27, 43, 44, 48.

Males, 6, 30, 32, 52.

Marking devices, 50;
collars, 53, 54;
ear notches, 57;
ear tags, 50, 51, 52, 53;
other, 50;
tatoos, 56.

Measurements:
body, 59;
canine, 70, 86;
foot, 4, 61;
nipple, 61.

Mortality:
other causes, 81, 82;
predation, 81, 82, 83, 84;
pseudepredation, 81.

Mountain lions, 4, 84, 86.

Narcan, 43, 44.

Necropsy:
bears, 77;
equipment, 76;
other animals, 84, 86, 88, 89.

Traps:

checking, 21, 23;
culvert, 19, 20, 21, 47;
snares, 22, 23, 24, 45, 47.

Trees:

chewed, 12;
clawed, 12, 17;
drugging in, 41;
stripped, 17;
rubbed, 15.

Trichinosis, 78.

Unrestrained drugging, 41.

Venipuncture, 72.

Weighing, 58.

Weights, 30, 32, 58.

Weight estimation, 30, 45.

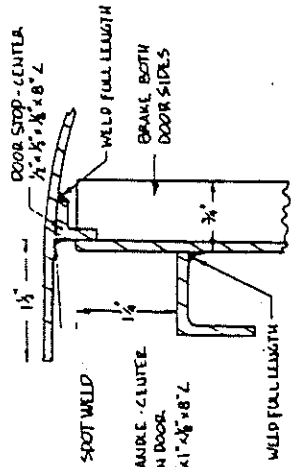
Weight-girth, 45, 119.

Young. *see* *Cubs*

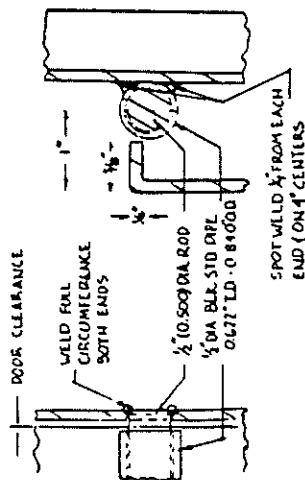
Notes:



Bear-Proof Garbage Container Plans



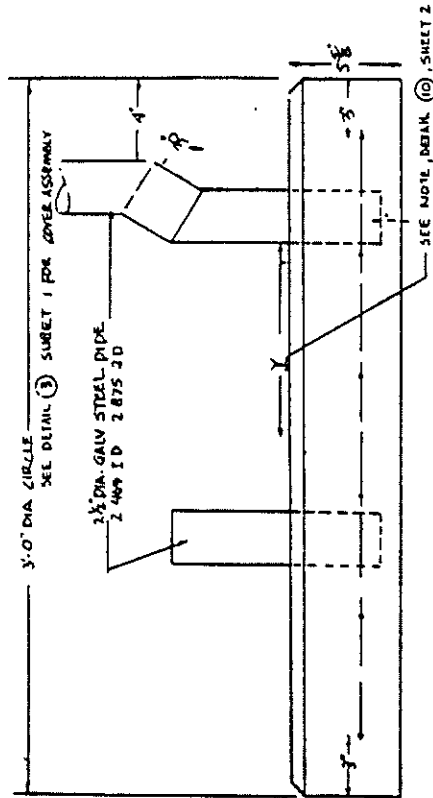
⑤ DETAIL A



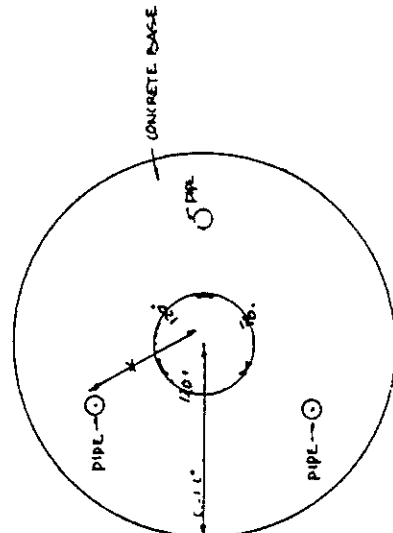
⑥ DETAIL B
SCALE 1"=1"

⑦ DETAIL C

BASE ALTERNATE ONE

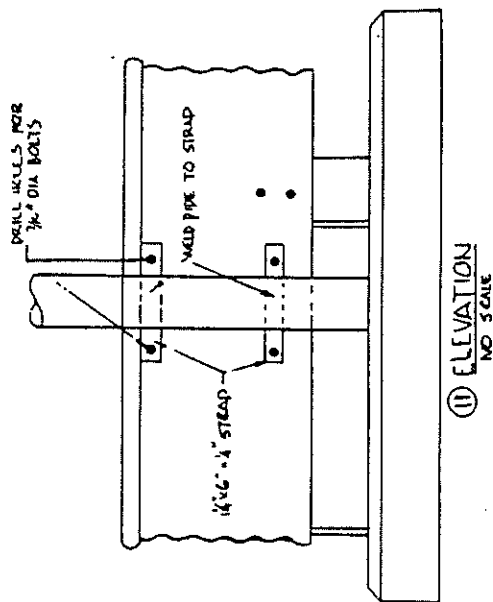


⑨ SIDE ELEVATION & PARTIAL SECTION
SEE NOTE, DETAIL ⑩, SHEET 2

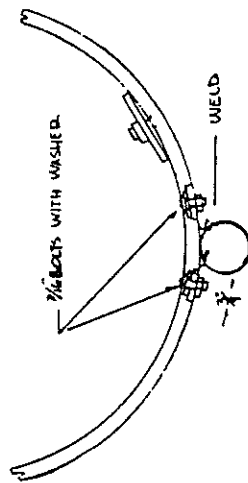


NOTE: RADIUS (R) ON PLANS
VARIES TO ACCOMMODATE ANY
SIZE CONTAINER. "Y" IS EQUAL
TO THE RADIUS OF THE BASE
OF THE CONTAINER PLUS 3.0"

BASE ALTERNATE TWO



⑪ ELEVATION
NO SCALE



⑫ PARTIAL PLAN
NO SCALE

- SPECIFICATIONS**
- ALL MATERIALS TO BE 12 GA. PLATE UNLESS OTHERWISE SHOWN.
 - ALL JOINTS TO BE CONTINUOUSLY WELDED UNLESS OTHERWISE SHOWN AND ALL SCALE AND SLAG REMOVED.
 - ALL SHARP EDGES AND CORNERS SHALL BE ROUNDED.
 - ALL MATERIAL SHALL BE NEW.
 - ALL SURFACES — INSIDE AND OUT — OF FINISHED TOP SHALL RECEIVE ONE COAT OF RUST PROHIBITING PRIMER AND ONE COAT OF HIGH QUALITY ENAMEL EXCEPT GALVANIZED SURFACES.
 - AREA TO CHOOSE COLOR — FINAL COAT AND LETTERS.