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FIGHT TO SAVE THE GRIZZLY

GRIZZLY STANDING. This is the story of the grizzly - the bear that walks like a man; that competes with man, that must live with man. Two life spans ago man and bear shared their environment on the North American continent. They were competitors, eating the same plants; killing the same quarry. Man respected the bear and the bear respected man. Both shared their living space with each other and with other creatures. They were part of a great natural community. None of its members were immune from attack; yet no species was threatened with extinction.

BEAR ON SNOW. The grizzly killed to survive; yet he lived in harmony. The great bear's land was vast and untouched. His domain was the land and the wildlife it supported.

Both the grizzly and the elk, which he preyed on when he could, inhabited the mountain meadows.

CALF ELK. The offspring of the elk and the offspring of the grizzly grew up in close proximity, grazing the same lush vegetation. There was space for all and with ample space there was togetherness.

SOW AND CUBS CROSSING CREEK. The elk lived their lives and the grizzlies lived theirs.
Elk followed by Grizzly.

MOOSE FEEDING. Moose also knew the grizzly as intimates, living their lives in the wet meadows along the mountain rivers. They had attributes that fitted them for a specific land and water niche. This niche in the great community was different than

the elk's and different than the bear's and thus all three could share and live.

BEAVER SWIMMING. The beaver and the moose enjoyed many plant foods in common, the aspen, the willow, the redozier. Their community niches were unique and so both flourished.

OTTERS ON LOG. Otter frequented the same waterways but their food was fish. (Shadow). Their closest competitor was the osprey. The feathered fisherman matched grace and skill with its mammalian counterpart - the otter. The osprey had evolved to catch fish with ease by diving from the air; OTTER SWIMMING. The otter captured them with equal ease by swimming under water.

GRIZZLY FISHING. At times both fishermen met competition from the grizzly; then their niches in the wildlife community overlapped. The Canada goose and the Trumpeter swan were other members of the wildlife complex. The Trumpeter swan is an endangered species, but they too had ties with the grizzly and with his neighbors.

PRONGHORN ANTELOPE. Before the white man arrived the grizzly inhabited the edge of the great plains as well as the mountains. He was neighbor to the pronghorn antelope. The mule deer, bighorn sheep, and bison also shared the land with grizzlies, but the ties between grizzlies and bison were the closest. The bison thrived on the endless supply of grass and the grizzly thrived on the winter kill from the countless herds of bison. The grizzly, the bison and the other creatures were interrelated in such a way that even though some were predators and some were prey there was room for all in this balanced ecosystem.
SOW & YEARLINGS MOUSING IN SNOW.

The bear hunted and ate the mouse and shared this food supply with the coyote. The Great gray owl, an efficient mouser, competed with both bear and coyote. The web of life was harsh and complex but unaltered from grass to mouse to owl to coyote to grizzly. And this was the way of things.

TETON MTS. Then the great white man arrived and coveted the land of "the great white bear". He altered the environment, drastically changed the wildlife community, and all but eliminated his competitors the Indian and the large carnivors. Ursus horribilis, the most feared and respected animal on the North American continent became scarce, then rare and is now in dnager of extinction. The grizzlies power and ferocity, once an asset for survival became a liability.

HUNTER WITH BEAR KILL. Its need for a vast unaltered homeland spelled disaster.

Present status

With the exploration of the West, the grizzly came in direct conflict with man and his interests.

GRIZZLIES SPARRING. One required wilderness to survive, the other sought to conquer it. The lord of the wilderness became a victim of this epic struggle.

SILHOUETTE OF BEARS. Its choice - adapt, move, or die.

MAP. One hundred and fifty years ago it roamed from Alaska to Mexico and from California to Kansas. Today, within the U.S., excluding Alaska, the grizzly is confined to our large National Parks and National Forest Wilderness areas. If this threatened species is to survive, we must minimize the conflict between these two great competitors.

CLOSE UP. CUB. To do this will require a thorough knowledge of the grizzly and his ways, the wisdom to apply the knowledge we gain and above all a tolerance to live and let live.

The Place.

SOWS & YEARLINGS ON BANK. A spark of concern ignited the flame of inquiry and we embarked on an investigation supported by scientific and conservation organizations. Yellowstone National Park, one of the few areas south of Alaska and Canada where grizzly bear populations still exist, became our laboratory. Our task was to study this formidable creature throughout the 5,000 square miles of Yellowstone and adjacent country. . . A land of thermal areas, geysers, awe inspiring falls, vast canyons, mountain peaks and mountain ranges.

MT. RANGE SHOT. A vast land of unbroken timber and unlimited sight-seers. A land to challenge both bear and man. A great wildlife paradise, where grizzly and man are learning to co-exist.

FEEDING BLACK BEAR. The black bear, quite a different creature than the grizzly, has adjusted almost too well. The lumbering roadside beggar is not to be confused with the shy yet fearless grizzly. Black bears climb trees; grizzlies do not. Grizzlies have long claws on the forefeet and a hump; black bears do not. Blacks are troublesome; grizzlies are dangerous.

Purpose and objectives

SOW WITH CUBS. In studying the grizzly, we had to seek and find answers to such questions as: How many grizzlies are there in Yellowstone Park and adjacent country?

Is the population increasing, decreasing or holding its own? What is the age structure of the population?

What is the birth rate? The death rate?
What are the causes of death?
At what age do they breed?
How long does a bear live, how long does a generation survive?
How much wilderness land does a bear family require? What are the land and biological requirements of an entire population?

LARGE SINGLE BOAR. In short, our goal was to learn almost as much about the vital life and death statistics of grizzlies as we know about humans. With such information we could write a life insurance policy for the grizzly bears of Yellowstone and this policy could be applied to grizzly bear populations elsewhere.

CLOSE UP OF SOW & YEARLING. Handling a grizzly is not a one-man job. It required a team of scientists and students working round the clock day in and day out for seven years throughout the seasons.

The team of researchers.

JOHN AND FRANK. John, a biologist with the Fish and Wildlife Service and Frank, a biologist with the National Geographic Society got the project under way and kept things going.

Maurice Hornocker and ERI
Bob Ruff and Charlie Ridenour were our able research assistants.
Hoke Franciscus and Joel Varney helped us develop the electronic equipment and kept it working.
Harry Reynolds and other students assisted, as on the job trainees.

The field

NIGHT SHOT OF BEAR. Grizzlies are active day and night, but they are largely nocturnal and we captured them by placing tempting bait in culvert traps. Some are cautious, others bold. The bear scents the bait at a distance, moves resolutely to the food, enters the trap, pulls the baited trigger and a steel door drops making a prisoner of the wilderness monarch. This one

BEAR BEHIND GRATE. The ferocious grizzly is much subdued following capture. Some fight the trap. One ripped out the grating. Our first task is to immobilize the bear.

MAURICE PREPARING JAB STICK. This is accomplished by injecting a drug, succinylcholine chloride, that blocks nerve transmission to the skeletal muscles. The dosage must be correct and is based on the weight of the bear. The researchers became skilled in judging weights; the dosage is then computed at 5 mgs. per pound of body weight. A jab stick with hypodermic syringe delivers the drug. Too heavy a dose could endanger the bear, too little endangers the researchers. There is no leeway for mistakes.

FRANK PEERING INTO TRAP. When the bear is in a favorable position Frank jabs him with the syringe stick. A quick thrust and in 3 to 5 minutes the powerful grizzly can be handled. Maurice notes the time of injection and records this on a form sheet. The behavior of the bear is observed as the drug takes effect. When he is fully drugged we prepare for the second step and take precautions - just in case! We must enter the trap before the bear revives and administer an anesthesia that will put the grizzly in a deep sleep for several hours. We inject pentobarbital sodium.

HAULING GRIZZLY OUT. When it has taken effect team members haul the grizzly out of the trap. A 600-pound grizzly doesn't pull easily. Some have weighed a thousand pounds.

JOHN RECORDING. Data on anesthetizing is recorded. A little team work and the big boar is out. The syringe is removed. A flichering of the eye tells he is asleep, not dead.

LAYING SLING. The next task is to weigh him. He is rolled into a nylon sling. Males weigh more than females. Even with a winch, weighing is a team effort. A very large male will weigh 1000 pounds, a large female half as much. This one weighed 400. During late summer some bears showed an average weight increase of 3 pounds per day.

USING TAPE. Each bear is measured - total length nose to eye, eye to eye, ear length, circumference of neck, length and width of the feet. Measurements of the forefeet are a reliable criterian of age and enable us to accurately age captured bears from yearlings to four-year-olds. The size of the claws change with age but are not dependable for determining age. The mouth is probed for bacteria. Old Bruno takes it all in stride, because he must, but shows evidence of waking up. More penta injected into the lungs puts him back to sleep and relaxes the research team.

RECORDING ON DENTAL CHART. We make a dental chart to show tooth wear and caries. Old bears like old people have bad teeth. Most mammals can be accurately aged by obtaining a series of skulls and then measuring tooth growth, tooth replacement and wear. The grizzly has proved no exception; but the dentition of an endangered species could not be collected.

MAKING A DENTAL IMPRESSION. To preserve the bear and still get his teeth we made dental impressions while the animals were anesthetized. Foot impressions made in a similar way gave us permanent records of foot size, and changes in foot size from cub,

to yearling, to 2, 3, and 4-years old.

REMOVING PAW FROM GELTRATE. The rubbery geltrate hardens in minutes. A detailed impression results. To study a grizzly bear population we had to know its age structure and this could be determined only by developing a method of aging live grizzlies in the field.

COLOR MARKING. A coded color marker enables us to recognize individual bears after they have been released back into the population. Each has a different color combination.

YOUNG COLLARED GRIZZLY. Some grizzlies could not be trapped and it was necessary to recapture others year after year. Over one hundred of these were shot, while free roaming, with propulsive syringe darts filled with such immobilizing drugs as succinylcholine chloride or sernylan. A young grizzly is baited to a predetermined spot. The dart strikes him and in minutes he is immobilized. A second shot puts him down and we add another bear to our list and more data to the files.

Montage
HAULING BEAR OUT OF TRAP. Season after season, year after year, grizzlies large and small are captured. In the seventh year of work we have captured 391 grizzlies; and 212 have been individually color marked, over 100 have been recaptured, some many times. Fifty families have been color marked and their movements and behavior observed in the wild. Some family geneologies run for nine years and involve three litters; the first born are now giving birth, in turn, to their first litters.

WEIGHING (HOLD) The processing becomes routine - weigh, measure, tattoo - but sometimes we face the unexpected and a large grizzly is up and at us. An aroused bear is nothing

fool around with. We exit with the bear in pursuit.

TWO COLLARED YEARLINGS. Even yearling bears weighing 225 pounds apiece demand respect, but we have some fun with two littermates as the drug wears off. Still unsteady and not fully coordinated but able to fight. Note the white collars of these young bears - such natural markings are not uncommon. A little exitement breaks the routine of processing and data gathering. The young grizzlies' instinct says attack, but there is a tranquilizing effect as the sernylan wears off and what otherwise could be a serious situation becomes a game. One final charge that made Harry ready to call quits and then the bear went off to the mountain.

GETTING MILK SAMPLE. Processing of each bear is not complete until we have taken milk samples from lactating females, blood from old and young and dental impressions from each age class.

The lab

MAKING DENTAL IMPRESSION. Data and specimens are brought into the lab for further processing. Dental stone is poured into the dental impressions to make dental casts. A foot cast is lifted from the geltrate impression. Foot and dental casts from the same bear can be compared year by year as growth occurs.

JOHN SHOWING CASTS. There is a marked change in the growth of canine teeth from cub to yearling to 2-year-old. The blood samples are centrifuged to obtain the serum. Chemical analyses of these show cholesterol and thyroid levels as well as changes in blood chemistry that occur with age and with changes in the seasons of the year. Compared to man, the grizzly's cholesterol level is high and its circulating thyroid level low.

MILK SAMPLES. The milk samples when analyzed show important differences as well as similarities between grizzly bear milk and the milk of other mammals. Bear milk is distinctive, being low in the sugar lactose.

When all is tabulated and interpreted, the data become facts, the facts become new information, the new information becomes a guide line to understanding, managing and preserving the grizzly.

FISHING CANYON DISTANT. The field biologist must adjust his work schedule to the wildlife and the seasons. Sixteen-hour days and seven-day weeks are not unusual, but it's not all work at the Yellowstone Lab.

Some go fishing in the Canyon of the Yellowstone. Maurice and I try for a big one. A four-pound native cutthroat caught in superlative scenery.
MAURICE HOLDING UP TROUT. Maurice's grin matches the size of the trout.

FIREHOLE. Others relax in the warm water of the Firehole River. Grizzlies are forgotten in the challenge of the fast water.
SNAKE RIVER. Bob, Charlie and Frank raft the turbulant Snake River at the foot of the Tetons. They enjoy a trip down one of the most scenic rivers in the world. The Grand Teton rises to 14,760 feet. The trout are hitting dry flies and they soon catch enough for a riverside snack. These fish are literally out of the water into the frying pan. The whitefish are taking stone fly nymphs. Whitefish belong to the trout family. They are scrappy fighters and good eating. With a hungry research crew to feed we catch and keep our limit of whitefish. A fringe benefit of wildlife work is an evening such as this. The day is over all too soon.

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FLOATING SNAKE IN EVENING. As our study of the grizzly progressed, it became evident that we would have to devise new study methods and techniques if we were to learn how far the grizzly roamed and where it hibernated, and if we were to locate individual bears in the 3,000 square miles of Yellowstone frequently enough during specific time intervals to place our observations on a quantitative and statistical level.

omit

Movie begins

Instrumenting a bear

PUTTING RADIO ON BEAR. We turned to the field of electronics and with the help of colleagues developed a biotelemetry or radiotracking system. This greatly extended the range of our observational powers. Let's see how it worked.

The 2-oz. transistorized transmitter ~~is transistorized and~~ emitted a pulsed signal on a frequency of 32 megacycles. Power is supplied by 9 mercury batteries ~~in series~~. The antenna is a tuned loop that fits around the bear's neck. The battery pack is taped to the antenna and connected to the transmitter.

FIBERGLASSING THE ANTENNAE. The transmitter assembly is fiberglassed to make it waterproof, shockproof, and bearproof.

Each transmitter has a different pulse rate and each is color coded.

PUTTING COLLAR ON BEAR. The collar-antenna with the transmitter is slipped over the bear's head.

The battery terminals are connected.

They are then covered with acrylic.

The next step is to test the strength of the pulsed radio signal with the field strength indicator.

With this final check the grizzly is ready for release.

BEAR STANDING COLLAR ON.

The drug wears off slowly. She makes a half-hearted attempt to remove the collar by scratching dog-fashion. The powerful forepaws would be more effective but she fails to use them.

HARRY WITH RECEIVER.

The pulsed signal of 72 beeps per minute comes in loud and clear on the directional receiver.

The grizzly, now completely recovered, moves off into the wilderness.

How the Radio Works

~~RADIO ANTENNA~~ Antenna Rotating

Her individual signal of 72 beeps per minute can be picked up from 20 miles away by the 5 element rotating antenna at our laboratory.

~~The~~ It points in the direction of the transmitter and thus the bear are indicated on the compass dial.

~~The compass~~ This bearing is recorded.

Then ~~it is~~ plotted on a map.

Our bear is northeast of the laboratory but we need more bearings to determine his exact position.

MOBILE UNIT.

A mobile receiving unit picks up the signal.

Maurice notifies base.

~~Frank takes~~ The message is received

From a field station deep in the back country comes word by radio-communication that they too have picked up the grizzly's pulsed signal.

The bearing is plotted.

Maurice erects the antenna of the mobile unit. + adjusts the receiver

He rotates the antenna and listens.

He determines the direction of the signal and reports this to base.

THREE BEARINGS ON MAP. The position of the grizzly is the intersection of the three bearings.

MARION. She is approximately 11 miles from the laboratory and living a normal life for a grizzly bear. The collar is hardly noticed. Much information is gathered from afar.

Tracking a Grizzly

MEN IN LAB.

But the real test of our tracking system is to follow the signal whether we can hike to the plotted position, locate the bear and observe her without ourselves being detected.

We make plans, assemble the needed equipment and Maurice and I take off at dawn.

The rifle is for use in emergency though we have never needed to use it. It has been a comfort but a burden

The directional receiver tells us how to travel to reach the bear.

WALKING WITH RECEIVER. Indicates the

The radio signal from the grizzly is continuous. The receiver picks it up and converts it to sound. of course, inaudible until picked up by

MARION

We are tracking the grizzly

The grizzly is our objective but other wildlife is noted as we move toward the signal source.

Canada geese make a noisy "take off".

A pair of mallards perched on a muskrat house seek the open water.

Adult trumpeter swans and cygnets seek the cover of the rushes. Once rare, they have gradually increased in numbers.

The adults are white; the cygnets grey.

FEET CROSSING STREAM.

Maurice and I move on guided by the signal.

A pair of coyotes eye us from a hill top.

A bull elk runs at our approach; then suddenly scents the grizzly.

Our signal tells us we are closing in.

F & M LOOK AT MAP

We pause to determine our position on the map. I notify base that the grizzly is now close. We move on directed by the signal.

The signal is booming in and from the shelter of the timber we spot our bear and her companions.

They are feeding on a buffalo carcass.

After observing for awhile we decide to approach closer.

RAVENS & BEAR

The ravens alert first and then the grizzly.

MOVE IN ON BEAR IN OPEN

We have accomplished the unique feat of locating an individual grizzly, sow No. 96, in 3,000 square miles of rugged country - 85 per cent wooded, and we have observed her behavior in the wild undetected.

8 montage

Montage

HOKE & FRANK COLLAR BEAR. This is but the beginning. over the past five years we have Radio-tagged 27 grizzlies. Some we have re-instrumented several times. One for 5 consecutive years. We have plotted home ranges, located the grizzlies' hibernation dens and followed them through the seasons observing breeding and social behavior. We have instrumented both sows and boars, old and young. Our knowledge of the grizzly has increased but we still have much to learn.

FRANK AND CHARLIE INSTRUMENTING. At the present time we can monitor the signal of an instrumented grizzly 24 hours a day for a full year. We can plot the bears movements during this time, deduct certain activities from signal changes and at any time move in to within 100 yards and make visual observations undetected. The scope and range of our observations has been greatly extended

FRANK & MORRIS. We have turned the tables on the Lord of the Wilderness.

GRIZZLY GETS UP. But the price of this knowledge is work and constant vigilance.

Fall Trek

CARRYING QUAD. In the fall of the year the grizzlys grow restless and begin to move. Bearings from the laboratory indicate that Grizzly #14 may be moving toward a den. We are ready to follow the signal and start out with full packs for a week of hiking. The portable quad antenna picks up the signal and tells us that our bear is high in the distant mountains.

STARTING HIKE. Our signal will direct us no matter where he moves. His sense of smell will alert him to our approach but the advantage is ours. We have turned the tables on the Lord of the Wilderness. Our objective is one particular grizzly but we take time to admire hoots with the Great Horned Owl. We hear the bugle of a bull elk. A pair of bulls stop us and we watch them spar, a sign that the rutting season is starting. In a few weeks the bugling will be frequent and the fights in dead earnest. The winner will rule the harem.

another bull elk bugles.

LUNCH. while we stop for lunch and we note the bison are herding up. The bulls will roar and fight for the cows. The wildlife community unfolds as we move in pursuit of the bear — across valleys, up mountains, through dense timber and windfall.

Insert A → Charlie WITH RECEIVER. The grizzly moves day and night and we are hard pressed to keep up with him. The signal is strong and after 4 days we spot our bear. We move in close with the wind in our favor. This is his fall foraging area and somewhere within a 5 or 6 square mile area is his winter den. The grizzly is reluctant to leave and we move in hoping to find the den. We fail after hours of searching; but we have further supported earlier observations - that the urge to move to their hibernating dens is triggered by a snow storm. We must wait for the approach of winter.

The Coming of Winter

SNOW STORM. In 1964 that day came on November 5. Winter arrived overnight and changes occurred. It put the game on the move. Elk began migrating to their winter ranges. The mountain lion will follow them down. The marten will take over the land of deep snow. The grizzlies moved toward their dens as though on command. # The coyotes visited an elk kill left by the grizzlies when the instinct to sleep overcame their drive to eat.
COMING OUT OF LAB. No biological clock alerted us to the change, but the radio signals coming into the lab told us the grizzlies were on the move.

Trek to the Hibernating Den

CLEANING SNOW OFF CAR. John, Bob, Charlie and I took off in haste but well prepared to track one or more of our instrumented bears to a winter den. We pick up a signal MARION & CUB. It is No. 40 and her cub. They have moved 8 miles during the early hours of the storm and no tracks are visible. But the radio tells us they are far ahead and moving.

~~oving.~~

GRIZZLY IN SNOW. We surprise another grizzly also on the move. The signal is still faint but we get a good bearing and move steadily on.
HIKING IN OPEN. The air is brisk and cold. The going slow.

MARION & CUB. But somewhere ahead is No. 40 and the strength of the signal tells us we are slowly closing the distance.

We pass our old friends the buffalo that can forage in deep snow, ~~and withstand the -40° of a Yellowstone winter~~. The Great Grey owl is insulated for winter weather and will feed on mice.
HIKING. But the bear will fast and sleep for 5 or 6 months.

The otter seems to revel in the new snow. Catching fish is no problem ~~with~~ for him winter or summer. When otter are fishing or playing it is impossible not to stop & watch.

HIKING. But our thoughts are on the bear - will the radio signal enable us to be the first to track a grizzly to its winter den.
CLOSE UP MARION. No. 40 is lethargic - but she dug her den in late summer and she and her cub will have no work to do when they arrive.
MOVE OFF. The signal increases in strength and the nulls are sharper.

BULL ELK HAREM. We come upon a bull elk and his harem. The bugle of the bull has a bell-like quality in the cold air. The bugle excites the cows, alerts the other bulls and thrills Bob and Charlie as do few other sounds in nature.

The calls of the cows are bird-like in quality.

Though the mating season is drawing to a close,
The bull is still attentive.

Calves born in June are still suckling but they will be weaned over winter and their mother will produce new life in the spring.

Two cows vie for leadership of the band.

passing, the air
MOVE OFF. The storm is clearing and we press onward amid the long shadows of evening.

We hope No. 40 is approaching the end of her journey. Tired but exuberant we move deeper into the wilderness now confident that we will find a den. The signal is booming in. The bear is close. We move cautiously scanning the forest - tense and alert - all of us ~~thinking~~ aware of what might happen if suddenly we came face to face with a grizzly at her den.

USING RECEIVER CLOSE UP. But something has happened - the signal is weaker and the direction finder tells us the bear is moving away. Have we moved in too fast? Have we spooked her? Must we spend the night and take up the trek in the morning?

With these thoughts ~~still fresh~~, we move around a slope and there is the den.
DEN. We inspect it briefly. Our receiver tells us the bear has moved off. We leave ~~off~~ too - concerned that she may not return if we disturb the den.
MOVING AWAY. It is a moment of personal triumph and satisfaction.
WINTER SCENE. We return to base and then disperse to our respective homes. Winter takes over and grizzly No. 40 sleeps as the snow piles up.

and within the dens
GRIZZLY STILL SLEEPING. For 5 months the grizzlies sleep. Sows give birth to cubs weighing 12 to 16 ounces, ~~in late January. The early risers move out of their dens in late March and early April.~~

Winters Scene + Range map → insert B

BUFFALO. We return to find the buffalo lean and gaunt, the trumpeter swans seeking a nesting territory, the white pelicans flying in formation along the Yellowstone River, congregating in groups and catching trout in the clear waters.

PELICAN & SHOT OF LAB. Snow is piled deep around the lab and we prepare to ski 15 miles back to No. 40's den. The radio collar is still on, for the signal coming in tells us that No. 40 and her yearling are already out of their den.

SKIING. The hills are baring up. We spot our first grizzly family, No. 150 and her three 2-year-olds. We skate on several feet of hard-packed snow. We follow a trail we blazed high on the trees last fall. The snow is rotten, traveling difficult.

CLOSE UP FRANK & CHARLIE. We spot No. 40 only 1/4 mile from her den. A hundred yards away we note her day beds on top of the snow and trees that she has debarked. We know No. 40 is not in her den yet approach with caution born of experience.

FRANK PEERS IN DEN. I satisfy myself that the yearling as well as the sow has gone.

~~FRANK ENTERING DEN~~ ~~The signal indicates the sow is moving away rapidly.~~ While I enter the den to take measurements, record temperature and obtain a soil sample. The signal is also being monitored from base. We move off in pursuit of No. 40.

Again we enter the den. This time to take flash pictures

Coyote Bear Sequence

COYOTE ON BUFFALO KILL. A coyote has found a winter-killed buffalo. We stop to watch the action. Number 40 is moving in. The coyote sees her and surrenders his feast. He plunges into the cold water. No. 40 now moves rapidly guided by the scent of the ripe bison. The signal booms in but we have no need for it now.

CLOSE UP - MARION & YEARLING. Our bear and her yearling are only 50 yards away. "How about a snack, Mom?" No. 40 had only moments to inspect her find when No. 12, a huge boar came over the hill. He too got the scent of food. No. 40 retreated and like the

coyote she and her yearling took to the icy waters of the river. We recognized the boar as #12; 900 lbs. of power and determination. V.O. "Come on, Mom, let's get out of here!"

LONE BEAR ALONG RIVER. Winter still lay heavily on the land but it was a "Coming out time" for grizzlies - a resurrection. The soft snow will not support their weight and traveling is difficult. Number 39 and her offspring were one of the families last fall we had tracked to their hibernating den. Now they have emerged but the radio collar is missing. The colored ear markers, however, identify them. A young boar enjoys a back scratch after the long sleep. A yearling is full of pep and vigor. A large boar travels in search of food. A sow alerts at his approach but soon returns to the task of catching mice. Field mice are the victims. The grizzlies locate them by smell. Watch the mouse run out on the snow.

SOW LUNGES AT MOUSE. A great lunge. The mouse seeks safety in the yearling's hairy coat. He ends up in his stomach. Another season has begun.

SOW AND YEARLINGS ON SNOWFIELD. Seven years of study have revealed much about the Yellowstone grizzlies.

Attracted by the winter kill of buffalo and elk, the lush grazing meadows of Hayden Valley and a National Park Service garbage dump, marked and unmarked grizzlies from all parts of Yellowstone and beyond converge on the high open park land of Hayden Valley. MAP. Some come singly and some in family groups. Some move from hibernation dens 12 to 15 miles away. Others trek from wintering areas 50 to 60 airline miles distant.

MARION. No. 40 has moved from her winter den into the valley. She has weaned her yearling and will breed this spring. Maternal care and protection is replaced by

aggressive behavior. The yearling departs in fear and haste. Weaning occurs in the spring. Not until the offspring are weaned is the sow receptive to the males. No. 40 has found herself a mate. This is the language of grizzly love, backed up by fierce fighting between contending males.

← # Group of Bears Moving

SINGLE BEAR. Grizzlies are social animals and when they concentrate to feed or to breed a social hierarchy is established. The more powerful and aggressive males vie for dominance. One large male dominates and is respected by all. Other members of bear society keep their distance.

SOW STANDING. Sows with cubs are alert but are respected by even the dominant male. Sows with yearlings and even sub-adult bears also become wary. A subtle undercurrent of fear and respect for the dominant male and his immediate contenders evolves the social hierarchy. Other large males contend or flee before the dominant male.

CLOSE UP ENGE. He seems to radiate authority. An 800-lb. boar approaches him with caution, then retreats in dignity. Others leave in haste.

ENGE - FULL FRAME. It is put up or shut up. Weaned yearlings and 2-year-olds must fend for themselves and are ~~at the bottom of~~ Low in the social structure. Family units of yearlings and 2-year-olds show deference only to the dominant male. They have status because they will stand and fight as a unit.

← Sow with yearlings

CLOSE UP LARGE BOAR.

The breeding season begins in late May. The large boars seek out the females in estrus. The dominant male takes his choice. Since only a third of the adult female population breeds each year there is keen competition for the ladies.

A boar has made his choice or was it the female?

MALE HERDING SOW. The other two-thirds of the adult females are engaged in raising families. Those with cubs, yearlings and 2-year-olds show no interest in the boars.

← Sow with cubs

cubs

Some sows wean their offspring as yearlings. Others maintain the family unit for another year weaning their ~~offspring~~ youngsters as 2-year-olds. Weaning is a difficult period for the ~~offspring~~ grizzlies.

SOW & YEARLINGS RISE AND STAND. With the loss of the security of a powerful and protective sow, the offspring become cautious, hesitant, even fearful of other family units and the adult members of bear society. Many wander great distances. ~~All are at the bottom of the social hierarchy.~~

PLAY. In spite of ~~great~~ disruptive changes in their lives it is a time for carefree play as well as a time for adjustment.

BEAR HOLDING UP PAWS. Do bears fingerpaint or is he learning to count? Who knows the thoughts of a bear?

SOW & YEARLINGS. An occasional sow will abandon her cubs or an unattentive mother will lose a cub. Sometimes these are adopted by other sows but more often they become orphans at an early age and must learn to fend for themselves. They must evade the large boars that will kill an unwary cub. They become experienced in the school of "hard knocks" but generally they survive though their growth may be stunted and their personalities warped.

SOW AND CUBS WALKING. Family life is epitomized in the sow with cubs. She tends to remain alone and aloof with her young family or to join and travel with other sows with cubs. She keeps her cubs close by and a "wuff wuff" will "freeze" them on the spot while she investigates a new bear, a strange situation or an unfamiliar scent. She is protective of her young, ready to fight the largest boar if need be. She will be supported by other sows that have cubs. When startled or aroused she is a formidable opponent, demanding respect from bear and man alike.

crossing stream

Two Sows with cubs — Bear standing — The danger part she goes about her family business.

INTRODUCTION

Fellow members and guests of the National Geographic Society, Mr. Chairman, ladies and gentlemen. It is a great pleasure as well as an honor to once again appear before a National Geographic audience - this time to show you a motion picture depicting our research work on the grizzly bear and to champion the cause of this endangered species. Our scientific studies of the grizzly and the film that we are presenting this evening have been made possible because of the wholehearted support of your Society. We wish to express our appreciation to all members of the staff that have worked with us. We also extend our thanks to the National Science Foundation, the U.S. Fish and Wildlife Service, the National Park Service, and the Boone and Crockett Club for their support.

FLOATING SNAKE IN EVENING As our study of the grizzly progressed it became evident that we would have to devise new study methods and techniques if we were to learn how far the grizzly roamed and where they hibernated, and if we were to locate individual bears in the 3000 square miles of Yellowstone frequently enough during specific time intervals to place our observations on a quantitative and statistical level.

Movie Begins

that enabled us to locate and track grizzlies from a distance.

Instrumenting a Bear

PUTTING RADIO ON BEAR. We turned to the field of electronics and with the help of engineers ~~colleauges~~ developed a biotelemetry or radiotracking system. This greatly extended the range of our observational powers. Let's see how it worked.

~~The 2-ounce transistorized~~ The transmitter emitted a pulsed signal ~~on a frequency of 32 megacycles~~ and weighs only 2 ounces. Power is supplied by mercury batteries. The antenna is a tuned loop that fits around the bear's neck. The battery pack is taped to the antenna and connected to the transmitter.

FIBERGLASSING THE ANTENNA. The transmitter assembly is wrapped with tape of fiberglassed and coated with resin to make it waterproof, shockproof, and bearproof.

Each transmitter has a different pulse rate and each is color coded.

PUTTING COLLAR ON BEAR. The collar-antenna with the transmitter is slipped over the bear's head.

The battery terminals are connected.
They are then covered with acrylic.
The next step is to test the strength of the pulsed radio signal with the field strength indicator. The differences in pulse rate enable us to identify individual bears.
With this final check the grizzly is ready for release.

radio-tagged

BEAR STANDING - COLLAR ON.

The drug wears off slowly. She makes a half-hearted attempt to remove the collar by scratching dog-fashion. The powerful forepaws would be more effective, but she fails to use them. ~~This is one reason why~~ Few grizzlies have removed their collars. Because of this

HARRY WITH RECEIVER.

The pulsed signal ~~of 72 beeps per minute~~ comes in loud and clear on the directional receiver.
The grizzly, now completely recovered, moves off ~~into the wilderness~~ to find a timbered retreat.

How the Radio Works

ANTENNA ROTATING.

Her ~~individual~~ signal of 72 beeps per minute can be picked up from 20 miles away by the rotating ~~5-element~~ antenna above our laboratory.
It points in the direction of strongest signal. The direction of the transmitter and thus the bear are indicated by the compass dial.
This bearing is recorded.
Then plotted on a map.
Our bear is northeast of the laboratory but we need more compass bearings to determine her exact position.

MOBILE UNIT.

A mobile receiving unit picks up the signal.
Maurice notifies base.
The message is received.
From a field station deep in the back country comes word by radio-communication that they too have picked up the grizzly's pulsed signal.
The bearing is plotted. while
Maurice erects the antenna of the mobile unit and adjusts the receiver. sensitivity and volume.
He rotates the antenna and listens.
He determines the direction of the signal and reports this to base. From such a high point such as this we can monitor an area of 1000 square miles and determine whether the bear is present.
counts the pulse rate

THREE BEARINGS ON MAP.
The grizzly's position is at the intersection of the three bearings.

MARION.
She is 11 miles from the laboratory and living a normal life for a grizzly bear. The collar is hardly noticed. Much information is thus gathered from afar.
on size of ranges and daily travel

Tracking a Grizzly

MEN IN LAB.
But the real test of our tracking system is to follow the signal to the plotted position, locate the bear, and observe her without ourselves being detected.
We make plans, assemble the needed equipment. Then Maurice and I take off at dawn.
The rifle is for emergency use. It has been a comfort, but we have never had to use it.
The directional receiver indicates how to travel to reach the bear.
As we start, we are greeted by the call of the sandhill crane.

WALKING WITH RECEIVER.

The radio signal from the grizzly, is, of course, inaudible until picked up by the receiver and converted to sound.

MARION.

We are tracking the grizzly, but other wildlife is noted as we move toward the signal source.

Canada Geese make a noisy take-off.

A pair of mallards perched on a muskrat house ~~seek the~~ swim toward open water.

Adult trumpeter swans and cygnets seek the cover of the rushes. Once rare, they have gradually increased in numbers.

The adults are white; the cygnets grey.

FEET CROSSING STREAM.

Maurice and I move on guided by the signal.

A pair of coyotes eye us from a hilltop.

A bull elk runs at our approach; then suddenly scents the grizzly.

Our signal tells us we are closing in. Prior to our use of radiotracking it was impossible to locate a specific grizzly ~~other~~ other than by chance encounter. Now we can ~~select~~ both the time and place.

F & M LOOK AT MAP.

We pause to determine our position on the map. I notify base that the grizzly is now close. We move on directed by the signal.

The signal is booming in and from the shelter of the timber we spot our bear and her companions.

They are feeding on a buffalo carcass.

After observing for awhile we decide to approach closer.

RAVENS AND BEAR.

The ravens alert first and then the grizzly.

MOVE IN ON BEAR IN OPEN.

We have accomplished the unique feat of locating an individual grizzly, sow #96, in 3,000 square miles of rugged country--85 per cent wooded--and we have observed her behavior in the wild undetected.

Montage

HOKE AND FRANK COLLAR BEAR.

This is but the beginning. Over the past five years we have radio-tagged 27 grizzlies. Some we have re-instrumented several times--one for 5 consecutive years.

We have plotted home ranges, located the grizzlies' hibernation dens, and we have followed them through the seasons observing breeding and social behavior.

We have instrumented both sows and boars, old and young. Our knowledge of the grizzly has increased but we still have much to learn.

FRANK AND CHARLIE INSTRUMENTING.

At the present time we can monitor the signal of an instrumented grizzly 24 hours a day for a full year.

We can plot the bear's movements during this time, deduct certain activities from signal changes, and at any time move to within 100 yards and make visual observations undetected.

The scope and range of our observational powers has been greatly extended.

CARRYING QUAD.

In the fall of the year the grizzlys grow restless and begin to move. ~~Bearings from~~ the laboratory indicate that grizzly #14 ~~may be~~ is moving toward a den.

We are ready to follow the signal and start out with full packs for a week of hiking. The portable quad antenna picks up the ~~signal~~ "beep" and tells us that our bear is high in the distant mountains.

STARTING HIKE.

Our signal will direct us ~~no matter~~ regardless of where he moves. His sense of smell will alert him to our approach but the advantage is ours. We have turned the tables on the Lord of the Wilderness.

Our objective is one particular grizzly.

We take time to admire a Great Horned Owl.

We hear the bugle of a bull elk.

A pair of bulls stop us and we watch them spar, a sign that the rutting season is starting. In a few weeks the bugling will be frequent and the fights in dead earnest. The winner will rule the harem.

LUNCH.

While we stop for lunch another bull elk bugles.

We note the bison are herding up. The bulls will roar and fight for the cows. ~~The wildlife community unfolds, coyotes howl, as~~ We move in pursuit of the bear -- across valleys, up mountains, through dense timber and windfall.

FRANK WITH RECEIVER.

We pick up another signal - from instrumented grizzly # 94. He is an orphaned yearling.

He travels and forages with three other orphaned yearlings. We named them the Four Musketeers. They fought, foraged & travelled together as a team. By instinct

Young grizzlies are often marked with distinctive collars. We take time to observe these bears and then move on following our original signal. — from # 14

WALKING IN LODGEPOLE.

The loop antenna is rotated to obtain the strongest signal and to get the signal nulls. Both are used to determine direction and course.

BEAR WITH COLLAR.

The bear we are tracking is still ahead of us.

THERMAL AREA.

So are some interesting thermal areas. Bears graze the lush grass growing in this hothouse environment.

CHARLIE AND FRANK.

Our beards grow, ~~long~~ and our belts tighten as our food supply dwindles.

LODGEPOLE TIMBER.

We cannot travel through the windfall and dense timber at night, so bivouac where darkness overtakes us. We try to camp on high ridges so we can continue to monitor the signal.

CHARLIE WITH RECEIVER.

The grizzly moves day and night so each morning we are hard-pressed to catch up with him. ~~The signal is strong and~~ After 4 days we spot our bear. We move in close with the wind in our favor.

This is his fall foraging area and somewhere within a 5 or 6 square mile area is his winter den.

The grizzly is reluctant to leave and we move in hoping to find the den.

We fail after hours of searching; but we have further supported earlier observations - that the urge to move to their hibernating dens is triggered by a snowstorm.

We must wait for the approach of winter.

The Coming of Winter

SNOW STORM.

In 1964 that day came on November 5th. Winter arrived overnight and put the game on the move. Elk began migrating to their winter ranges.

The mountain lion will follow them down.

The marten will remain in the land of deep snow.

The grizzlies move toward their dens as though on command.

The coyotes visit an elk kill left by the grizzlies when the instinct to sleep overcame their drive to eat.

COMING OUT OF LAB.

No biological clock alerted us to the change, but the radio signals coming into the lab told us the grizzlies were on the move.

Trek to the Hibernating Den

CLEANING SNOW OFF CAR.

John, Bob, Charlie, and I take off in haste but well prepared to track one or more of our instrumented bears to a winter den. We pick up a signal.

MARION AND CUB.

It is #40 and her cub. They have moved 8 miles during the early hours of the storm and no tracks are visible. But the radio tells us they are far ahead and moving.

GRIZZLY IN SNOW.

We surprise another grizzly also on the move. ~~Pass~~ trudge
The signal is still faint but we get a good bearing and ~~move~~ steadily on.

HIKING IN OPEN.

The air is brisk and cold. The going slow. The snow is still not deep enough for skis or snowshoes.

MARION AND CUB.

But somewhere ahead is #40, and the strength of the signal tells us we are slowly closing the distance.

We pass ~~our~~ old friends, the buffalo that can forage in deep snow.
The Great Grey Owl is insulated for winter weather and will feed on mice.

HIKING.

But the bear that escapes the rigors of a cold winter by ~~will~~ fast and sleep for 5 or 6 months.
The otter seems to revel in the new snow. The other hand, the otter meets the challenge of winter and catching fish is no problem for them ~~him~~ winter or summer.
When otter are fishing or playing it is impossible not to stop and watch the show.

HIKING.

But our thoughts are on the principal actor, the bear. Will the radio signal enable us to be the first to track a grizzly to its winter den? This was a major objective of our radiotracking research development.

CLOSE UP MARION.

#40 is lethargic - but she dug her den in late summer and she and her cub will have no work to do when they arrive.

MOVE OFF.

The signal increases in strength and the nulls are sharper.

BULL ELK HAREM.

We come upon a bull elk and his harem. The bugle of the bull has a bell-like quality in the cold air. The calls of the cows are bird-like.

The bugle excites the cows, alerts the other bulls, and thrills Bob and Charlie as do few other sounds in nature.

Though the mating season is drawing to a close, the bull is still attentive.

Calves born in June are still suckling but they will be weaned over winter and their mothers will produce new life each spring.

Two cows vie for leadership of the band.

MOVE OFF.

The storm is passing, the air clearing, and we press onward amid the long shadows of evening.

We hope #40 is approaching the end of her journey. Tired but exuberant we move deeper into the wilderness, now confident that we will find a den.

The signal is booming in. The bear is close. We move cautiously scanning the forest - tense and alert - all of us aware of what might happen if suddenly we come face to face with a grizzly at her den.

USING RECEIVER CLOSE UP.

But something has happened - the signal is weaker and the direction finder tells us the bear is moving away.

Have we moved in too fast? Have we spooked her? Must we spend the night and take up the trek in the morning?

With these thoughts, we move around a slope and there is the den.

DEN.

We inspect it briefly. Our receiver tells us the bear has moved off. We leave too, concerned that she may not return if we disturb the den.

MOVING AWAY.

It is a moment of personal triumph and satisfaction.

WINTER SCENE.

We return to base and then disperse to our respective homes. Winter takes over and grizzly #40 sleeps as the snow piles up.

the bear named Marion,

GRIZZLY STILL SLEEPING.

For 5 months the grizzlies sleep. And within the dens sows give birth to cubs weighing 12 to 16 ounces.

WINTER SCENE AND RANGE MAP.

The grizzlies' dens are within their home ranges. The location and sizes of these were determined from hundreds of radio fixes taken ~~and bearings taken around the clock and~~ throughout the seasons. Within these home ranges they find all the requirements for life - food, shelter, mates, den sites.

grizzlies

They are significant for

BUFFALO.

In spring we return to find the buffalo lean and gaunt, the trumpeter swans seeking a nesting territory, the white pelicans flying in formation along the Yellowstone River, congregating in groups and catching trout in the clear waters.

PELICAN AND SHOT OF LAB.

Snow is piled deep around the lab ~~and~~ when we prepare to ski 15 miles back to #40's den.

The radio collar is still on, ~~for~~ the signal coming in tells us that #40 and her yearling are already out of their den.

SKIING.

Bare spots appear on southern slopes.

The days grow warmer, ~~the hills are baring up.~~ We spot our first grizzly family; ~~#40~~ and her ~~three~~ 2-year-olds. We radiotracked this family in previous years. It is good to see them again. slow

The radio signal is not needed for

We skate over several feet of hard-packed snow. We follow a trail blazed high on the trees last fall. The snow is rotten and crusted, sometimes making traveling difficult.

She used these after leaving the den

CLOSE UP FRANK AND CHARLIE.

Pause through the lodgepole pines

We spot #40 only 1/4 mile from her den - then ski on. A hundred yards away we note her beds on top of the snow and trees that she has debarked. We know #40 is not in her den yet approach with caution born of experience.

She has stripped the bark from trees for lining.

also

FRANK PEERS IN DEN.

I satisfy myself that the yearling as well as the sow has gone.

instruments

Most dens are dug at the base of large trees. The root system provides support

FRANK ENTERING DEN.

While I enter the den to take measurements, record temperature, and obtain a soil sample, the grizzlies travel on the crusted snow. Their signal is being monitored from base.

We find that the den is lined with spruce boughs. The temperature inside is considerably warmer than during winter.

Again we enter the den. This time to take flash pictures. By radio voice communication we get a bearing from base. We record this data, then move off in pursuit of #40.

Coyote-Bear Sequence

COYOTE ON BUFFALO KILL.

A coyote has found a winter-killed buffalo. We stop to watch the action.

#40 is moving in. The coyote sees her and surrenders his feast. He plunges into the cold water.

Marion #40 now moves rapidly guided by the scent of the ripe bison. The signal booms in but we have no need for it now.

CLOSE UP - MARION AND YEARLING.

Our bear and her yearling are only 50 yards away. The cub's nudge says, "How about a snack, Mom?"

#40 had only moments to inspect her find when #12, a huge boar, came over the hill. He too got the scent of food.

Marion #40 retreated and like the coyote she and her yearling took to the icy waters of the river.

We recognized the boar as #12 - 900 pounds of power and determination. He is the dominant boar. The cub seems to say, "Come on, Mom, let's get out of here!"

LONE BEAR ALONG RIVER.

Winter still lay heavily on the land but it was a "coming out time" for grizzlies; a resurrection. The soft snow will not support their weight, and traveling is difficult.

#39 and her offspring were one of the families we tracked to their hibernating den last fall. Now they have emerged but the radio collar is missing. The colored ear markers, however, identify them.

A young boar enjoys a back scratch after the long sleep.

A yearling is full of pep and vigor.

A large boar travels in search of food. A sow alerts at his approach but soon returns to the task of catching mice. Field mice are the victims. The grizzlies locate them by smell. Watch the mouse run out on the snow.

and are consumed in quantity.

SOW LUNGES AT MOUSE.

A great lunge. The mouse seeks safety in the yearling's hairy coat. He ends up in his stomach. Another season has begun.

and for.ms

SOW AND YEARLINGS ON SNOWFIELD.

Seven years of study have revealed much about the Yellowstone grizzlies--habitat preference, food habits, seasonal movements.

Marked and unmarked grizzlies from all parts of Yellowstone and beyond converge on the high open park land of Hayden Valley.....

Attracted by the winter kill of buffalo and elk, the lush grazing meadows and a ~~National~~ Park Service garbage dump.

MAP.

Some come singly and some in family groups. Some move from hibernation dens 12 to 15 miles away. Others trek from wintering areas 50 to 60 airline miles distant.

within and beyond the Park—

MARION.

#40 has moved from her winter den into the valley. She has weaned her yearling and chased him off. Marion She will breed this spring. Her Maternal care and protection is replaced by agressive behavior. The yearling departs in fear and haste.

~~Weaning occurs in the spring.~~ Not until the offspring are weaned is the sow receptive to a mate.

#40 has found herself a mate. This is the language of grizzly love.

~~It is backed up by fierce fighting between contending males.~~

GROUP OF BEARS MOVING.
It is backed up by fierce fighting between contending males.

SINGLE BEAR.
Grizzlies are social animals and when they concentrate to feed or to breed, a social hierarchy is established. The more powerful and aggressive males vie for dominance.

One large male dominates and is respected by all. Other members of bear society keep their distance.

SOW STANDING.
Sows with cubs are alert but are respected by even the dominant male. Sows with yearlings and even sub-adult bears also become wary.

A subtle undercurrent of fear and respect for the dominant male and his immediate contenders evolves the social hierarchy. Other large males contend or flee before the dominant male.

CLOSE UP INGE.
He seems to radiate authority....An 800-pound bear approaches him with caution, then retreats in dignity. Others leave in haste.

INGE - FULL FRAME.
With Inge
It is put up or shut up. Weaned yearlings and 2-year-olds must fend for themselves, and are low in the social structure. Family units of yearlings and 2-year-olds show deference only to the dominant male.

SOW WITH YEARLINGS.
They have status because they will stand and fight as a family unit.

CLOSE UP - LARGE BOAR.

The breeding season begins in late May. The large boars seek out the females in estrus. The dominant male takes his choice.

~~Since~~ Only a third of the adult female population breeds each year, so there is keen competition for the ladies.

MALE HERDING SOW.

A boar has made his choice - or was it the ~~female~~ sow? The other two-thirds of the adult females are engaged in raising families.

SOW WITH CUBS.

Those with cubs, yearlings, and 2-year-olds show no interest in the boars.

Some sows wean their offspring as yearlings. Others maintain the family unit for another year, weaning their youngsters as 2-year-olds. Weaning is a difficult period for the young grizzlies.

SOW AND YEARLINGS RISE AND STAND.

With the loss of the security of a powerful and protective sow, the offspring become cautious, hesitant, even fearful of other family units and the adult members of bear society. Many wander great distances.

PLAY.

In spite of disruptive changes in their lives it is a time for carefree play as well as a time for adjustment.

BEAR HOLDING UP PAWS.

Do bears fingerpaint or is he learning to count? Who knows the thoughts of a ~~bear~~ grizzly?

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An occasional sow will abandon her cubs, or an inattentive mother will lose a cub. We have learned that Sometimes these are adopted by other sows but more often they become orphans at an early age and must learn to fend for themselves. without a mother

They must evade the large boars that will kill an unwary cub. They become experienced in the school of hard knocks but generally they survive, though their growth may be stunted and their personalities warped.

SOW AND CUBS WALKING AND CROSSING STREAM.

Family life is epitomized in the sow with cubs. She tends to remain alone and aloof with her young family or to join and travel with other sows with cubs.

She keeps her cubs close by and a "wuff, wuff" will freeze them on the spot while...

TWO SOWS WITH CUBS.

..while she investigates a new bear, a strange situation, or an unfamiliar scent.

She is protective of her young, ready to fight the largest boar if need be. She will be supported by other sows that have cubs.

When startled or aroused she is a formidable opponent, demanding respect from bear and man alike.

BEAR STANDING.

The danger past, she goes about her family business.

The courageous fighter is only one side of her nature.

CLOSE UP OF SOW PAWING CUB.

Family life consists of much affection and motherly care. The sow is a doting mother, the cubs loveable but mischievous children. Their days are filled with

long pause

romping, with exploring the strange and new...

BEARS BOXING.

..in rough and tumble tussling in friendly fashion as mother looks on. Or in boxing manlike while brother surveys the arena, then wanders off alone and thereby learns a fact of bear life. A boar approaches and some instinct warns the unprotected cub. We have observed four cubs killed by boars

His mother gives a warning "woof, woof". In seconds he sheds his independence and is back in the family circle. ~~Pause~~

CLOSE UP CUBS EATING MEAT - CUBS NURSING.

At 5 to 6 months of age the cubs learn to forage for themselves, but still mother's milk is the main larder. Nursing cubs sound like the staccato of a jack hammer.

SOWS AND YEARLINGS LYING DOWN.

The family units of yearlings and 2-year-olds are more complacent, more secure. They face any situation in bear life as a ~~unit.~~ team — and as we have found all hibernate together in the same den.

SOW AND YEARLINGS PLAYING.

An aggressive sow with aggressive yearlings is high in the social order and this formidable array of bear power is respected. A large sow will weigh 550 pounds.

By fall her yearlings will weigh 250 pounds apiece. A sow with 3 yearlings is a confident devastating unit of 1300 pounds of bear flesh. Even a thousand pound boar will concede to her.

learning to dig up nourishing tubers, or discovering the delights of tasty mountain

SOW AND YEARLINGS ON SKYLINE.

The family units of yearlings and 2-year-olds spend much time foraging, ~~playing, romping, and exploring.~~ play also romp and play as do the cubs.

BEAR STANDING.

The sub-adult bears of both sexes gradually become independent of family ties.

SOW AND CUB.

Survival of the population is dependent on the annual increment. Each year about 30 cubs are added to the Yellowstone population. The average litter contains two.

Some sows produce only one while others may have 3 and very rarely four.

SOW OF FOUR WALKING AWAY.

For seven years we have collected information on our color-marked and radio-instrumented grizzlies.

SUNSET SHOTS. have discovered

We ~~know~~ how fast they reproduce, at what age the females breed, the age specific mortality rate, the reproductive potential and the causes of death, how much living room they require, what they eat and where they den, how a bear population behaves, how they conflict with man, and what we must do to insure their survival.

Only two life spans ago the grizzly was the dominant animal on the North American continent. Now, armed with knowledge, do we have the wisdom and that spark of concern to do what is necessary to save the grizzly or will another life span of 75 years find that our way of life with its massive alteration of the natural environment...

SILHOUETTED SHOT OF BEAR AND YEARLINGS.

...and our intolerance of competition has spelled disaster for the great white bear?

We can write a life insurance policy or we can allow the grizzly to move into the sunset of time.

The courageous fighter
~~But this~~ is only one side of her nature.

Pawing
CLOSE UP OF SOW & CUB.

Family life consists of ~~a lot of~~ much affection and motherly care. The sow is a doting mother, the cubs lovable but mischievous children. Their days are filled with romping, with exploring the strange and new, in rough and tumble tussling in friendly fashion as mother looks on. Or in boxing manlike while brother surveys the arena, then wanders off alone and thereby learns a fact of bear life. A boar approaches and some instinct warns the unprotected cub. His mother gives a warning "woof woof". In seconds he sheds his independence and is back in the family circle.

Bears BOXING

CLOSE UP CUB EATING MEAT CUBS NURSING. At 5 to 6 months of age the cubs learn to forage for themselves but still mother's milk is the main larder. Nursing cubs sound like the staccato of a jack hammer.

← sow + yearlings playing

lying down
SOWS & YEARLINGS. The family units of yearlings and 2-year-olds are more complacent, more secure. They face any situation in bear life as a unit. An aggressive sow with aggressive yearlings is high in the social hierarchy and this formidable array of "bear power" is respected ~~by even the most aggressive boars~~ by the largest. A large sow will weigh 550 pounds. By fall her yearlings will weigh 250 lbs. apiece. A sow with 3 yearlings is a confident devastating unit of 1300 lbs. of bear flesh. Even a 1000 lb. boar will concede to her.

SOW & YEARLINGS ON SKYLINE. ~~Like the cubs~~, The family units of yearlings and 2-year-olds spend much time ~~sleeping~~ foraging, playing and romping and exploring.

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For over seven years we have learned a lot from our color marked and radio-instrumented grizzlies.
SUNSET SHOTS. We know how fast they reproduce, at what age the females breed, the age specific mortality rate, the reproductive potential and the causes of death, how much living room they require, what they eat and where they den, how a bear population behaves, how they conflict with man and what we must do to insure their survival.

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Fight to Save the Grizzly

Reel 1

Introduction — Narration — Scenic

Music

This is the story of the grizzly - the bear that walks like a man; that competes with man, that must live with man.

Two life spans ago man and bear shared their environment on the North American continent. They were ~~as brothers~~ competitors, eating the same plants; killing the same quarry. ~~Like all animals,~~ Both ~~bear and man~~ shared their living space with each other and with other creatures. They were part of a great natural community. None of its members were immune from attack; yet no species was threatened with extinction. The grizzly killed to survive; yet he lived in harmony. The great bear's land was vast and untouched. His domain was the land and the wildlife it supported.

Man respected the bear and the bear respected man.

Both the grizzly and the elk, which he preyed on when he could, inhabited the ~~same high~~ mountain meadows. The offspring of the elk and the offspring of the grizzly grew up in close proximity, grazing the same lush vegetation. There was space for all and with ample space there was togetherness. The elk lived their lives and the grizzlies lived theirs.

Moose also knew the grizzly as intimates, living their lives in the wet meadows along the mountain rivers. They had attributes that fitted them for a specific land and water niche. This niche in the great community was different than the elk's and different than the bear's and thus all three could share and live.

The beaver and the moose enjoyed many plant foods in common, the aspen, the willow, the redozier. Their community niches were unique and so both flourished.

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Otter frequented the same waterways but their food were fish. Their closest competitor was the osprey. The feathered fisherman matched grace and skill with its mammalian counterpart - the otter. The osprey had evolved ~~so that it could~~ to catch fish with ease by diving from the air; the otter captured them with equal ease by swimming under water. At times both fisherman met competition from the grizzly; then their niches in the wildlife community overlapped. The Canada goose and the Trumpeter swan were other members of the wildlife complex. They too had ties with the grizzly and with his neighbors.

Before the white man arrived the grizzly inhabited the edge of the great plains as well as the mountains. He was neighbor to the pronghorn antelope. The mule deer, bighorn sheep, ~~sheep,~~ and bison also shared the land with grizzlies, but the ties between grizzlies and bison were the closest. The bison thrived on the endless supply of grass and the grizzly thrived on the winter kill from the countless herds of bison. The grizzly, the bison and the other creatures were interrelated in such a way that even though some were predators and some were prey there was room for all in this balanced ecosystem. The bear hunted and ate the mouse and shared this food supply with the coyote. The Great gray owl, an efficient mouser, competed with both bear and coyote. The web of life was harsh and complex but unaltered from grass to mouse to owl to coyote to grizzly. And this was the way of things.

Then the great white man arrived and coveted the land of "the great white bear". He altered the environment, drastically changed the wildlife community, and all but eliminated his competitors the Indian and the large carnivors. Ursus horribilis, the most feared and

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respected animal on the North American continent became scarce, then rare and is now ~~threat-~~ in danger of ~~ened with~~ extinction. The grizzlies and ~~Its~~ power, ~~its~~ ferocity, once an asset for survival became a liability. Its need for a vast unaltered homeland spelled disaster.

Present status

~~One hundred and fifty years ago at the threshold~~ With of the exploration of the West, the grizzly ~~was abundant. These large carnivores were~~ came in direct conflict with man and his interests. One required wilderness to survive, the other sought to conquer it. The lord of the wilderness became a victim of this epic struggle. Its choice - adapt, move, or die. One hundred and fifty years ago ~~And~~ it roamed from Alaska to Mexico and from California to Kansas. Today, within the U.S., excluding Alaska, the grizzly is confined to our large National Parks and National Forest Wilderness areas. If this threatened species is to survive, we must minimize the conflict between these two great competitors. To do this will require a thorough knowledge of the grizzly and his ways, the wisdom to apply the knowledge we gain and above all a tolerance to live and let live.

The Place

A spark of concern ignited the flame of inquiry and we embarked on an investigation supported by scientific and conservation organizations. Yellowstone National Park, one of the few areas south of Alaska and Canada where grizzly bear populations still exist, became our laboratory. Our task was to study this formidable creature throughout the 5,000 square miles of Yellowstone and adjacent country . . . a land of thermal areas, geysers, awe inspiring falls, vast canyons, mountain peaks and mountain ~~ges~~. A vast land of unbroken timber and unlimited sightseers. A land to challenge

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both bear and man. A great wildlife paradise, a grizzly's "happy hunting ground" where bear and man are learning to co-exist. The black bear, quite a different creature than the grizzly, has adjusted almost too well. The lumbering roadside beggar is not to be confused with the shy yet fearless grizzly. Black bears climb trees; grizzlies do not. Grizzlies have long claws on the forefeet and a hump; black bears do not. Blacks are troublesome; grizzlies are dangerous.

Purpose and objectives

In studying the grizzly, we had to seek and find answers to such questions as: How many grizzlies are there in Yellowstone Park and adjacent country? Is the population increasing, decreasing or holding its own? What is the age structure of the population?

What is the birth rate? The death rate?

What are the causes of death?

At what age do they breed?

How long does a bear live, how long does a generation survive?

How much wilderness land does a bear family require? What are the land and biological requirements of an entire popu lation?

In short, our goal was to learn almost as much about the vital life and death statistics of grizzlies as we know about humans. With such information we could write a life insurance policy for the grizzly bears of Yellowstone and this policy could be applied to grizzly bear populations elsewhere.

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Handling a grizzly is not a one-man job. It required a team of scientists and students working round the clock day in and day out for seven years throughout the seasons.

The team of researchers

John, a biologist with the Fish and Wildlife Service and Frank, a biologist with the National Geographic Society got the project under way and kept things going.

Maurice Hornocker

Bob Ruff and

Charlie Ridenour were our able field assistants.

Hoke Franciscus and

Joel Varney helped us develop the electronic equipment and kept it working.

Harry Reynolds and other students assisted, as on the job trainees.

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The field

Grizzlies are active day and night, but they are largely nocturnal and we captured them by placing tempting bait in culvert traps. Some are cautious, others bold. The bear scents the bait at a distance, moves resolutely to the food, enters the trap, pulls the baited trigger and a steel door drops making a prisoner of the wilderness monarch.

The ferocious grizzly is much subdued following capture. Our first task is to immobilize the bear. This is accomplished by injecting a drug, succinylcholine chloride, that blocks nerve transmission to the skeletal muscles. The dosage must be correct and is based on the weight of the bear. The researchers became skilled in judging weights; the dosage is then computed at 5 mgs. per pound of body weight. A jab stick with hypodermic syringe delivers the drug. Too heavy a dose could endanger the bear, too little endangers the researchers. There is no leeway for mistakes.

When the bear is in a favorable position Frank jabs him with the syringe stick. A quick thrust and in 3 to 5 minutes the powerful grizzly can be handled. Maurice notes the time of injection and records this on a form sheet. The behavior of the bear is observed as the drug takes effect. When he is fully drugged we prepare for the second step and take precautions - just in case! We must enter the trap before the bear revives and administer an anesthesia that will put the grizzly in a deep sleep for several hours. We inject pentobarbital sodium. When it has taken effect team members haul the grizzly out of the trap. A 600-pound grizzly doesn't pull easily. Some have

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weighed a thousand pounds. Date on anesthetizing is recorded. A little team work and the big boar is out. The syringe is removed. A flickering of the eye tells he is asleep, not dead.

The next task is to weigh him. He is rolled into a nylon sling. Even with a winch, weighing is a team effort. Males weigh more than females - a very large male will weigh 1000 pounds, a large female half as much. During late summer some bears showed an average weight increase of 3 pounds per day. Each bear is measured - total length nose to eye, eye to eye, ear length, circumference of neck, length and width of the feet. Measurements of the forefeet are a reliable criterian of age and enable us to accurately age captured bears from yearlings to four-year-olds. The size of the claws change with age but are not dependable for determining age. The mouth is proved for bacteria. Old Bruno takes it all in stride, because he must, but shows evidence of waking up. More penta puts him back to sleep and relaxes the research team.

We make a dental chart to show tooth wear and caeies. Old bears like old people have bad teeth. Most mammals can be accurately aged by obtaining a series of skulls and then measuring tooth growth, tooth replacement and wear. The grizzly has proved no exception; but the dentition of an endangered species could not be collected. To preserve the bear and still get his teeth we made dental impressions while the animals were anesthetized. Foot impressions made in a similar way gave us permanent records of foot size, and changes in foot size from cub, to yearling, to 2, 3, and 4-year-old. The rubbery geltrate hardens in minutes. A detailed impression results. To study a grizzly bear

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population we had to know its age structure and this could be determined only by developing a method of aging live grizzlies in the field. A coded color marker enables us to recognize individual bears after they have been released back into the population. Each has a different color combination.

Some grizzlies could not be trapped and it was necessary to recapture others year after year. Over one hundred of these were shot while free roaming with propulsive syringe darts filled with such immobilizing drugs as succinylcholine chloride or sernylan. A young grizzly is baited to a predetermined spot. The dart strikes him and in minutes he is immobilized. A second shot puts him down and we add another bear to our list and more data to the files.

Montage

Season after season, year after year, grizzlies large and small are captured. In the seventh year of work we have captured ~~over~~ 391 grizzlies; ~~more than~~ and 212 have been individually color marked, over 100 have been recaptured, some many times. Fifty families have been color marked and their movements and behavior observed in the wild. Some family geneologies run for nine years and involve three litters; the first born are now giving birth, in turn, to their first litters.

The processing becomes routine - weigh, measure, tattoo - but sometimes we face the unexpected and a large grizzly is up and at us. An aroused bear is nothing to fool around with. We exit with the bear in pursuit.

Processing Bears	Narration	Scenic

Even yearling bears weighing 225 pounds a piece demand respect, but we have some fun with two littermates as the drug wears off. Still unsteady and not fully coordinated but able to fight. Note the white collars of these young bears - such natural markings are not uncommon. A little excitement breaks the routine of processing and data gathering. The young grizzlies' instinct says attack, but there is a tranquilizing effect as the sernylan wears off and what otherwise could be a serious situation becomes a game. One final charge that made Harry ready to call quits and then the bear went off to the mountain.

Processing of each bear is not complete until we have taken milk samples from lactating females, blood from old and young and dental impressions from each age class.

The lab

Data and specimens are brought into the lab for further processing. Dental stone is poured into the dental impressions to make dental casts. A foot cast is lifted from the geltrate impression. Foot and dental casts from the same bear can be compared year by year as growth occurs. There is a marked change in the growth of canine teeth from cub to yearling to 2-year-old. The blood samples are centrifuged to obtain the serum. Chemical analyses of these show cholesterol and thyroid levels as well as changes in blood chemistry that occur with age and with changes in the seasons of the year. Compared to man, the grizzly's cholesterol level is high and its circulating thyroid level low.

Processing Bears	Narration	Scenic

The milk samples when analyzed show important differences as well as similarities between grizzly bear milk and the milk of other mammals.

When all is tabulated and interpreted, the data become facts, the facts become new information, the new information becomes a guide line to understanding, managing and preserving the grizzly.

Recreation | Narration | Scenic

The field biologist must adjust his work schedule to the wildlife and the seasons. Sixteen-hour days and seven-day weeks are not unusual, but it's not all work at the Yellowstone Lab.

Some go fishing in the Canyon of the Yellowstone. Maurice and I try for a big one. A four-pound native cutthroat caught in superlative scenery. Maurice's grin matches the size of the trout.

Others relax in the warm water of the Firehole River. Grizzlies are forgotten in the challence of the fast water. Bob, Charlie and Frank raft the turbulant Snake River at the foot of the Tetons. They enjoy a trip down one of the most scenic rivers in the world. The trout are hitting dry flies and they catch enough for a riverside snack. They are literally out of the water into the frying pan. The whitefish are taking nymphs. With a hungry research crew to feed we catch and keep our limit of whitefish. A fringe benefit of wildlife work is an evening such as this.

The day is over all too soon.

End of Reel 1

Reel 2

Narration | Scenic

Introduction Prior to Starting Reel 2

As our study of the grizzly progressed, it became evident that we would have to devise new study methods and techniques if we were to learn how far the grizzly roamed and where it hibernated, and if we were to locate individual bears in the 3,000 square miles of Yellowstone frequently enough during specific time intervals to place our observations on a quantitative and statistical level.

Movie begins

Instrumenting a bear

We turned to the field of electronics and with the help of colleagues developed a biotelemetry or radiotracking system. This greatly extended the range of our observational powers. Let's see how this worked.

The 2-oz. transmitter is transistorized and emitted a pulsed signal on a frequency of 32 megacycles. Power is supplied by 9 mercury batteries in series. The antenna is a tuned loop that fits around the bear's neck. The battery pack is taped to the antenna and connected to the transmitter. The transmitter assembly is fiberglassed to make it waterproof, shockproof, and bearproof.

Each transmitter has a different pulse rate and each is color coded.

The antenna with the transmitter is slipped over the bear's head.

The battery terminals are connected.

They are then covered with acrylic.

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The next step is to test the strength of the pulsed radio signal with the field strength indicator.

With this final check the grizzly is ready to release.

The drug wears off slowly. He makes a half-hearted attempt to remove the collar by scratching dog-fashion. The powerful forepaws would be more effective but he fails to use them.

The pulsed signal of 70 beeps per minute come in loud and clear on the directional receiver.

The grizzly now completely recovered moves off into the wilderness.

How the Radio Works

His individual signal of 70 beeps per minute can be picked up at 20 miles distance by the 5 element yagi antenna at our laboratory.

The antenna rotates and the direction of the transmitter and thus the bear are indicated on the dial.

The compass bearing is recorded.

Then it is plotted on a map.

Our bear is northeast of the laboratory but we need more bearings to determine his exact position.

A mobile receiving unit picks up the signal.

Maurice notifies base.

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Frank takes the message.

From a field station deep in the back country we receive word by radio-communication that they too have picked up the bear's pulsed signal.

The bearing is plotted.

Maurice erects the antenna of the mobile unit.

He rotates the antenna and listens.

He determines the direction of the signal and reports this to base.

The position of the grizzly is at the intersection of the three bearings.

She is approximately 15 miles from the laboratory and living a normal life for a grizzly bear. The ~~color~~ collar is hardly noticed.

Tracking a Grizzly

The real test of our radio system is whether we can hike to the plotted position of the bear and observe her without ourselves being detected.

We make plans and Maurice and I takk off at dawn.

The rifle is for an emergency, though we have never needed to use it.

The directional receiver tells us how to travel to get to the bear.

The radio signal from the grizzly is continuous. The receiver picks it up and converts it to sound.

The grizzly is our objective but other wildlife is noted as te move toward the signal source.

Candda geese make a noisy "take off".

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A pair of mallards perched on a muskrat house seek the open water.

Adult trumpeter swan and cygnets seek the cover of the rushes. Once rare, they have gradually increased in numbers.

The adults are white; the cygnets grey.

Maurice and I move on guided by the signal.

A pair of coyotes eye us from a hill top.

A bull elk runs at our approach; then suddenly scents the grizzly.

Our signal tells us we are closing in.

We pause to determine our position on the map. I notify base that the grizzly is now close.

The signal is booming in and from the shelter of the timber we spot our bear and her companions.

They are feeding on a buffalo carcass.

After observing for awhile we decide to move in.

The ravens alert first and then the grizzly.

We have accomplished the unique feat of locating an individual grizzly, sow No. 96, in 3,000 square miles of rugged country - 85 per cent wooded, and we have observed her behavior in the wild undetected.

Narration | Scenic

Montage

This is but the beginning. In the past five years we have instrumented ____ grizzlies. Some we have re-instrumented several times. One for 5 consecutive years. We have plotted home ranges, located the grizzlies' hibernating dens and followed them through the seasons observing breeding and social behavior. We have instrumented both sows and boars, old and young. Our knowledge of the grizzly has increased but we still have much to learn.

At the present time we can monitor the signal of an instrumented grizzly 24 hours a day for a full year. We can plot its movements during this time, deduct certain activities of the bear from signal changes and at any time move in to within 100 yards and make visual observations undetected. We have turned the tables on the Lord of the Wilderness. The price of this knowledge is work and constant vigilance.

Fall Trek

In the fall of the year bear and man grow restless and the grizzlies begin to move. Bearings taken at the laboratory indicate that we may have a bear moving toward a den. We are ready to follow the signal and we start out with full packs for a week of hiking. The portable quad antennae picks up the signal and tells us that our bear is high in the distant mountains.

Our objective is one particular grizzly but we take time to exchange hoots with the Great Horned Owl. A pair of bulls stop us and we watch them spar, a sign that the rutting season is approaching. In a few weeks the bugling will be frequent

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and the fights in dead earnest. The winner will rule the harem. A stop for lunch and we note the bison are herding up. The bulls will roar and fight for the cows. The wildlife community literally comes to life as we move in pursuit of the bear.

The grizzly moves day and night and we are hard put to keep up with him. The signal is strong and after 5 days we spot our bear. We move in close with the wind in our favor. This is his fall foraging area and somewhere within a 5 or 6 sq. mile area is his winter den. The grizzly is reluctant to leave and we move in hoping to find the den. We fail after hours of searching; but we have further supported earlier observations - that the urge to move to their hibernating dens is triggered by a snow storm. We must wait for the approach of winter.

The Coming of Winter

In 1964 that day came on November 5. Winter arrived overnight and changes occurred. It put the game on the move. Elk began migrating to their winter ranges. The mountain lion will follow them down. The marten will take over the land of deep snow. The grizzlies moved toward their dens as though on command. The coyotes visited an elk kill left by the grizzlies when the instinct to sleep overcame their drive to eat. No biological clock alerted us to the change, but the radio signals coming into the lab told us the grizzlies were on the move.

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Trek to the Hibernating Den

John, Bob, Charlie and I took off in haste but well prepared to track one or more of our instrumented bears to a winter den. We pick up a signal. It is No. 40 and her cub. They have moved 8 miles during the early hours of the storm and no tracks are visible. But the radio tells us they are far ahead and moving. We surprise another grizzly also on the move. The signal is still faint but we get a good bearing and move steadily on. The air is brisk and cold. The going slow.

But somewhere ahead is No. 40 and the strength of the signal tells us we are slowly closing the distance.

We pass our old friends the buffalo that can forage in deep snow and withstand the -40° of a Yellowstone winter. The Great Grey owl is insulated for winter weather and will feed on mice. But the bear will fast and sleep for 5 or 6 months.

The otter seems to revel in the new snow. Catching fish is no problem with him winter or summer.

But our thoughts are on the bear - will the radio signal enable us to be the first to track a grizzly to its winter den? No. 40 is lethargic - but she dug her den in late summer and she and her cub will have no work to do when they arrive.

The signal increases in strength and the nulls are sharper.

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We come upon a bull elk and his harem. The bugle of the bull has a bell-like quality in the cold air. It excites the cows, alerts the other bulls and thrills Bob and Charlie as do few other sounds in nature.

The bull is still atëentive.

The calves born in June are still suckling but they will be weaned over winter and their mother will produce new life in the spring.

Two cows vie for leadership of the band.

The storm is clearing and we press onward amid ~~the~~ long shadows of evening.

We hope No. 40 is approaching the end of her journey. Tired but exuberant we move deeper into the wilderness now confident that we will find a den. The signal is booming in. The bear is close. We move cautiously scanning the forest - tense and alert - all of us thinking what might happen if suddenly we came face to face with a grizzly at her den.

But something has happened - the signal is weaker and the direction finder tells us the bear is moving away. Have we moved in too fast? Have we spooked her? Must we spend the night and take up the trek in the morning?

With these thoughts still fresh, we move around a slope and there is the den. We inspect it briefly. Our receiver tells us the bear has moved off. We move off too - concerned that she may not return if we disturb the den. It is a moment of personal triumph and satisfaction. We return to base and then disperse to our respective homes. Winter takes over and grizzly No. 40 sleeps as the snow

`s up.

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For 5 months the grizzlies sleep. Sows give birth to cubs weighing 12 to 16 ounces in late January. The early risers move out of their dens in late March and early April. We return to find the buffalo lean and gaunt, the trumpeter swans seeking a nesting territory, the white pelicans flying in formation along the Yellowstone River, congregating in groups and catching trout in the clear waters.

Snow is piled deep around the lab and we prepare to ski 15 miles back to No. 40's den. The radio collar is still on for the signal coming in tells us that No. 40 and her yearling are already out of their den. The hills are baring up. We spot our first grizzly family, No. 150 and her three 2-year-olds. We travel on 7 feet of hard-packed snow. We follow a trail we blazed high on the trees last fall. We spot No. 40 only 1/4 mile from her den. A hundred yards away we note her day beds on top of the snow and trees that she has debarked. We know No. 40 is not in her den yet approach with caution born of experience. I satisfy myself that the yearling as well as the sow has gone. The signal indicates the sow is moving away rapidly. I enter the den and take measurements, record temperature and obtain a soil sample. The signal is also being monitored from base. We move off in pursuit of No. 40.

Narration | Scenic

Coyote Bear Sequence

A coyote has found a winter-killed buffalo. We stop to watch the action. Number 40 is moving in. The coyote sees her and surrenders his feast. He plunges into the cold water. No. 40 now moves rapidly guided by the scent of the ripe bison. The signal booms in but we have no need for it now. Out bear and her yearling are only 50 yards away. "How about a snack, Mom?" No. 40 had only moments to inspect her find when No. 12 a huge boar came over the hill. He too got the scent of food. No. 40 retreated and like the coyote she and her yearling took to the icy waters of the river. "Come on, Mom, let's get out of here."

Winter still lay heavily on the land but it was a "Coming out time" for grizzlies - a resurrection. The soft snow will not support their weight and travelling is difficult. Number 39 and her offspring was one of the families that last fall we had tracked to their hibernating den. Now they have emerged but the radio collar is missing. The colored ear markers, however, identify them. A young bear enjoys a back scratch after the long sleep. A yearling is full of pep and vigor. A large boar travels in search of food. A sow alerts at his approach but soon returns to the task of catching mice. Field mice are the victims. The grizzlies locate them by smell. Watch the mouse run out on the snow/

A great lunge. The mouse seeks safety in the yearling's hairy coat. He ends up in his stomach. Another season has begun.

Natural History
Narration

Scenic

Seven years of study have told us much about the Yellowstone grizzlies.

Attracted by the winter kill of buffalo and elk, the lush grazing meadows of Hayden Valley and a National Park Service garbage dump, marked and unmarked grizzlies from all parts of Yellowstone and beyond converge on the high open park land of Hayden Valley. Some come singly and some in family groups. Some move from hibernation dens 12 6o 15 miles away. Others trek from wintering areas 50 o 60 airline miles distant.

No. 40 has moved from her winter den into the valley. She has weaned her yearling and will breed this spring. Maternal care and protection is replaced by aggressive behavior. The yearling departs in fear and haste. Weaning occurs in the spring. Not until the offspring are weaned is the sow receptive to the males. No. 40 has found herself a mate. This is the language of grizzly love, backed up by fierce fighting between contending males.

Grizzlies are social animals and when they concentrate to feed or to breed a social hierarchy is established. The more powerful and aggressive males vie for dominance. One large male dominantes and is respected by all. Other members of bear society keep their distance. Sows with cubs are alert but are respected by even the dominant male. Sows with yearlings and even sub-adult bears also become wary. A subtle undercurrent of fear and respect for the dominant male and his immediate contenders evolves the social hierarchy. Other large males contend or flee before the dominant male. He seems to radiate authority. An

Narration | Scenic

800-lb. boar approaches him with caution, then retreats in dignity. Others leave in haste. It is put up or shut up. Weaned yearlings and 2-year-olds must fend for themselves and are at the bottom of the social hierarchy. Family units of yearlings and 2-year-olds show deference only to the dominant male. They have status because they will stand and fight as a unit.

The breeding season begins in late May. The large boars seek out the females in estrus. The dominant male takes his choice. Since only a third of the adult female population breeds each year there is keen competition for the ladies.

The other two-thirds of the adult females are engaged in raising families. Those with cubs, yearlings and 2-year-olds show no interest in the boars. Some sows wean their offspring as yearlings. Others maintain the family unit for another year weaning their offspring as 2-year-olds. Weaning is a difficult period for the offspring. With the loss of the security of a powerful and protective sow, the offspring become cautious, hesitant, even fearful of other family units and the adult members of bear society. Many wander great distances. All are at the bottom of the social hierarchy. In spite of great changes in their lives it is a time for carefree play as well as a time for adjustment. Do bears fingerpaint or is he learning to count? Who knows the thoughts of a bear.

Narration | Scenic

An occasional sow will abandon her cubs or an unattentive mother will lose a cub. Sometimes these are adopted by other sows but more often they become orphans at an early age and must learn to fend for themselves. They must evade the large boars that will kill an unwary cub. They become experienced in the school of "hard knocks" but generally they survive though their growth may be stunted and their personalities warped.

Family life is epitomized in the sow with cubs. She tends to remain alone and aloof with her young family or to join and travel with other sows with cubs. She keeps her cubs close by and a "wuff wuff" will "freeze" them on the spot while she investigates a new bear, a strange situation or an unfamiliar scent. She is protective of her young, ready to fight the largest boar if need be. She will be supported by other sows that have cubs. When startled or aroused she is a formidable opponent, demanding respect from bear and man alike.

But this is only one side of her nature.

Family life consists of a lot of affection and motherly care. The sow is a doting mother, the cubs lovable but mischievous children. Their days are filled with romping, with exploring the strange and new; in rough and tumble tussling in friendly fashion as mother looks on. Or in boxing manlike while brother surveys the arena, then wanders off alone and thereby learns a fact of bear life. A boar approaches and some instinct warns the unprotected cub. His mother gives a warning "woof woof". In seconds he sheds his independence and is back in the family circle.

Narration | Scenic

At 5 to 6 months of age the cubs learn to forage for themselves but still mother's milk is the main larder. Nursing cubs sound like the staccato of a jack hammer.

The family units of yearlings and 2-year-olds are more complacent, more secure. They face any situation in bear life as a unit. An aggressive sow with aggressive yearlings is high in the social hierarchy and this formidable array of "bear power" is respected by even the most aggressive boars. A large sow will weigh 550 lbs. By fall her yearlings will weigh 250 lbs. apiece. A sow with 3 yearlings is a confident devastating unit of 1300 lbs. of bear flesh. Even a 1000 lb. boar will concede to her.

Like the cubs, the family units of yearlings and 2-year-olds spend much time sleeping, playing and romping and exploring.

The sub-adult bears of both sexes gradually become independent of family ties.

Survival of the population is dependent on the annual increment. Each year about 30 cubs are added to the Yellowstone population. The average litter size is 2. Some sows produce only one while others may have 3 and very rarely 4.

In seven years we have learned a lot from our color marked and radio-instrumented grizzlies. We know how fast they reproduce, at what age the females breed, the age specific mortality rate, the reproductive potential and the causes

Narration	Scenic

of death, how much living room they require, what they eat and where they den, how a bear population behaves, how they conflict with man and what we must do to insure their survival.

Only 2 life spans ago the grizzly was the dominant animal on the North American continent. Now armed with knowledge, do we have the wisdom and that spark of concern to do what is necessary to save the grizzly or will another life span of 75 years find that our way of life with its massive and wholesale alteration of the natural environment and our intolerance of competition has spelled disaster for the great white bear. We can write a life insurance policy or we can allow the grizzly to move into the sunset of time.