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A research project designed to investigate many important aspects of grizzly bear ecology was initiated during 1959 in Yellowstone National Park and now has been conducted for four years. It is planned to carry on the work for at least another two years. Some tentative findings and conclusions are presented, but it is realized that further work may alter these and thus the investigators reserve final judgment on all statements presented here.

The project has been coordinated through the Montana Cooperative Wildlife Research Unit at Montana State University.

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*Contribution from the Montana Cooperative Wildlife Research Unit; U.S. Fish and Wildlife Service, Montana State Fish and Game Department, Montana State University, and Wildlife Management Institute cooperating.

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SUMMARY OF SOME TENTATIVE FINDINGS AND CONCLUSIONS

1. During a four-year period (1959-1962), 141 grizzlies have been captured and individually color marked; 41 have been shot free-ranging in the field using drug laden propulsive syringes, and 100 have been trapped. A total of 227 bears have been handled in the capturing and recapturing operations.
2. In 1962, 101 of 141 marked bears were theoretically still in the population; 69 of these were observed and individually identified one or more times.
3. Among 141 grizzlies marked during a four-year period, 31 or 22 per cent, have died from various causes while 9 others are considered to have died, but their deaths not specifically confirmed. This would indicate a death rate among marked bears of about 28 per cent, or an average of 7 per cent per year.
4. Various techniques for determining population numbers have been used. A minimum population of 170 grizzlies is known to inhabit Yellowstone National Park during the summer months. This population level has remained stable during the four years.
- ✓ 5. The age stratification of this population is: cubs 20 per cent; yearlings 10 per cent; two-year olds 7 per cent; three, four, and five year olds 14 per cent; and adults 49 per cent.
- ✓ 6. Approximately 50 per cent of the cubs attaining the age of nine months apparently do not survive to the age of ~~one and one-half~~ years.
- ✓ 7. Sex ratio in the population is one to one.
8. The ratio of adults to those bears considered immature and "young adults" is approximately one to one.
- ✓ 9. The average litter size for cubs during a four-year period was 2.1, with a maximum yearly average of 2.3. The largest litter recorded was 4 cubs.
- ✓ 10. A 64 per cent differential exists between sows with cubs and sows with yearlings. This cannot be fully explained by orphaning or weaning and is believed to be due largely to mortality of entire litters during or just after their first "hibernation."
- ✓ 11. Thirty-three per cent of the adult female population produce cubs each year, but only 13 per cent of the adult female population were observed with yearling litters.
- ✓ 12. Annual increment has averaged 20.2 per cent.

13. The annual increment is thought to closely approximate the annual mortality, keeping the population numbers stable.
- ✓ 14. Legal shooting of grizzlies by hunters outside the boundaries of Yellowstone accounts for 42 per cent of all recorded mortalities.
15. Necessary control measures within the Park accounted for 18 per cent of all mortalities; this rises to 26 per cent if grizzlies trapped and shipped to zoos are included.
16. During a four-year period the fate of 91 cubs (of which approximately one-third were color marked) was determined to be:
 - 47 per cent lived two years or longer,
 - 14 per cent were known mortalities,
 - 39 per cent were never re-observed or accounted for after the first year of life.
17. The cause or causes of cub mortality between November and May have not yet been determined.
18. Cubs orphaned at six months of age have survived a year or more.
19. Growth is more rapid and survival higher among litters weaned at two years than among litters weaned at one year or among orphaned cubs.
20. Some three-year old females breed and there is evidence that some males also breed at this age.
21. The breeding season extends from about June 10 to July 10 reaching a peak of activity in late June.
22. A complex but well-defined stratification of members in the population exists, based largely on aggressive behavior and is best defined during the breeding season.
23. One large male has actively assumed and held the dominant position in the dominance structure for three years although four other males have strongly contended for this position.
24. Aggressiveness and reproductive condition appeared to govern the females' behavior toward adult males, while aggressiveness, age, and size determined their social rank in relation to other members of the population.
25. Grizzlies have well-defined summer ranges and in fall tend to return to ranges occupied in spring. This suggests two separate foraging areas frequently separated by great distances.

26. Many bears have moved air line distances of 25 to 60 miles over mountainous terrain. Daily movements may exceed 15 miles. Some have traveled as far as 35 miles over extremely rugged terrain in less than two days.
27. The spring and fall movements of grizzlies to areas of food abundance and to "hibernating sites" can be considered migrations. Individual home ranges are extensive and overlap; in some instances covering a large portion of the Park and extending into adjacent country.
28. Grizzlies exhibit strong homing tendencies, returning to summer foraging areas following trapping and releasing.
29. Readily available food such as ~~garbage~~^{refuse}, carrion, berries, pine nuts, and kills of elk or buffalo will attract grizzlies from great distances and hold them for extensive periods of time.
30. Grizzlies in Yellowstone are naturally gregarious where food is concerned. They fight for choice food and defend choice feeding sites, but where food is abundant, they tolerate one another in large aggregations within an established social order.
31. Grizzlies average about 150 per cent increase in weight from cub to yearling class with approximately 40 per cent increase in total length.
32. An average adult female will weigh about 300 pounds in the spring, and about 380 pounds in the fall. An average adult male weighs approximately 500 and 575 pounds in the spring and fall, respectively. Total length remains relatively constant through the seasons, being 70 inches for females and 78 inches for males. Maximum weights recorded have been 780 pounds for males, 495 pounds for females. Minimum weights have been 310 pounds for adult males, 225 pounds for adult females.
33. There appears to be a significant correlation between tooth development and age and between foot size and age from cub through three and four years of age. Bears can be accurately aged to three years by dentition and by size of fore paws.
34. Grizzlies exhibit a low circulating thyroid (P.B.I. levels of from 2.3 to 3.3 mcg. %). This suggests a hypothyroid state exists in the bear. Observed absence of arteriosclerosis is in spite of low P.B.I. levels and a high normal serum cholesterol level (by human standards).
35. An entire wildlife radio-tracking system consisting of a base station, field station, mobile unit and portable tracking units, pulsed transmitters and voice communication system has been field tested and put into operation. Five grizzlies have been instrumented with transmitters and tracked for varying periods of time. The tracking system has the potential for gathering hitherto unavailable information on the grizzly bear. *Reprints of "Radio-tracking of Grizzly Bears" Proceedings Interdisciplinary Conf. on the Use of Telemetry in the Study of Animal Behavior and Physiology will be available March 1963.*

Grizzly Bear Statistics

SIZE: Stand 3 - 3 ½ feet at shoulders - stand 8½ to 9 feet
LENGTH: 6½ feet; 70" females, 78" males
WEIGHT: adult males: 500 - 1000 lbs; cubs in June: 15 - 25 lbs.
adult females: 225 - 550 lbs.; cubs in October: up to 150 lbs.
large bear - 800-1125 *large female 350-550 lbs*

COLOR: black to straw brown, grizzled color changing to dull matted brown with age
Many have light tipped guard hairs that give a silvery appearance.

Young bears often have white to light colored collars.

CHARACTERISTICS: Long claws on front paws - adapted for digging, 2"- 3"
Shoulder hump prominent, face concave, ears rounded
Walk on soles of feet, rotate forearm to grasp and hold objects

AGE: 23 - 25 years, females produce young 19 - 20 years of age
Longevity - oldest bear 25.5 yrs. max. reprod age 22.5 ♀ with 2 cubs

BREEDING: Occurs from mid May to mid July, height of breeding June

Both males and females promiscuous

Large dominant males fight for females, inflict most injuries with jaws.

Duration of oestrus varies - 16 to 25 days - 2 oestrus cycles

Copulation - av. 23 min.; max. 60 min.

HIERARCHY: Linear social hierarchy exists where bears are numerous

SEXUAL MATURITY: Females do not attain sexual maturity until $4\frac{1}{2}$ yrs. old
Some do not have first litters until 8 and 9 years of age
Males mature

BREEDING INTERVAL: Three years, some may breed every 2 years

SEX RATIO: Adults about 1 to 1. Male cubs outnumber female cubs
45% of adult females breed each year (15 animals in YNP)
as adult males are slightly more numerous

GESTATION PERIOD: 6 to 8 weeks (approx. 2 months)

PERIOD OF EMBRYONIC DELAY: 5 to 6 months, blastocysts or early
embryos do not immediately implant but remain free in the uterus.
Microscopic blastocysts implant about time grizzly enters
winter den

BIRTH: Occurs in den about February 1

CUBS: 1 to 4 in litter, normally 2; av. 2.1, max yearly av. 2.3

Weight 12 - 18 ounces, blind, naked.

Leave den area May - June; cubs 10 - 12 lbs, furred

WEANING: Prior to breeding season, May, June, aggressively harasses cubs
Wean cubs as yearlings or as 2 yr. olds.

FAMILY LIFE: Male no role, most females disciplinarians, males
occasionally kill cubs.

Range and Former Numbers

POPULATION: 175 - 200, max. 250 in Yellowstone ecosystem
(based on censuses)

av. age composition

AGE STRUCTURE: Average cubs: 19%, yearlings 13%, 2-yr. olds 11%,
3 & 4 yr. olds 13%, adults 44%
Adults: 5 to 25 years of age.

AVERAGE GROWTH: (1959-1967) slow growing: 1.7 bears per year

REPRODUCTIVE RATE: (Trout Creek population, av. 116) - .68

REPRODUCTIVE RATE 1968 - 1971: .66

ACTIVITY: Active 24 hrs, but largely nocturnal

May travel up to 75 miles within extensive home ranges

HIBERNATION: (winter sleep)

DATES OF HIBERNATION: Oct. 21-22 to Nov. 21, over 9 yr. period
varied by a month. Entered dens during snowstorm with snow on
ground.

DURATION: Nov. 9 April: 6 months

EARLIEST DEN DIGGING: Sept. 3 & 8, latest digging Nov. 11 & 15.

DEN CONSTRUCTION: All dens dug by grizzlies, some probably reused.
Excavation period about 1 week, no natural shelters used.
Lined with bough beds.

HIBERNATION (Cont.):

DEN SITES: timbered areas, 7,800 to 9,200 feet., northern slopes
den entrance facing north, usually at base of large tree, far
from human activity and development (isolation)

DEN SIZE: Length of bed chamber and entrance way: av. 92"

Av. bed chamber 56 x 53 x 37" (10 dens)

Av. den opening: width 22", ht. 34"

DEN TEMPERATURE: 26 to 28 degrees F.

BEAR TEMPERATURES: Shallow hypothermia, drop of body temp. of 5 -
11 degrees F.

Body temp. 90 - 96 degrees F., metabolic rate corres-
pondingly high.

RESPIRATION RATE: As low as 12/min. (Folk)

HEART RATE: As low as 8/min (Kalabukhov)

AROUSAL: Easily aroused from winter lethargy.

Donnerstag

Topic: Grizzly Bear Behavior Determined by Radiotracking

ECOLOGY

- ✓ 1. Portrait - 8 year ecological study, Yellowstone National Park. 11 years continuous, aging, family groups.
- ✓ 1A Graduate and Undergraduate students, some high school - 27 students trained.
- ✓ 2. Mother and 4 cubs - Remnant population, ^{7 min. 175} maximum 200, growth of population slow. Average number cubs 2+.
- ✓ 3. Cub grizzly - Marked cubs, Yellowstone population recruitment average 33/year.
- ✓ 4. Foraging group of grizzlies - Gone from West - Mont. and Yellowstone.
- ✓ 5. Grizzlies and trap - Trapped, processed over ⁵⁵⁰ ~~558~~, marked over 200 (256).
- ✓ 6. Shooting grizzly - Shot and immobilized dozens of free-roaming grizzlies. Drugs: Sucostrine and Sernalyn ^{1 mg./5 lb body wt. 100 mg/cc sol.}
_{1 mg./1 lb " " " "}
- ✓ 7. Grizzlies at night - Most active at night - need techniques for studying them. *Developed radio-tracking system*
- ✓ 8. Instrumenting #14 - First grizzly instrumented 1961, home and seasonal ranges, territoriality, behavior.
- ✓ 9. Portrait with collar - Simultaneous monitoring, ^{4 grizzlies}
- 10. Immobilized bear (collar) - 1961-70- 49 grizzlies instrumented, monitored total 1250 days. 24 different grizzlies.

TRACKING SYSTEM

- 11. Transmitter - 32.0 MHz 100 MW, 1.8 oz. wt., 3-12 month life.
- 12. Fiberglassed transmitter - Waterproof, resonant, tuned-loop antenna.
- ✓ 13. Base antenna - 5-element yagi antenna. Range 12-20 miles
- ✓ 14. Plotting fixes - Intersecting bearings (fixes) plotted on maps.
- ✓ 15. Mobile Unit - Bearings of distant or moving animals, 1200 sq. miles monitored.
- ✓ 16. Field Station - 8 miles from base station.
- ✓ 17. Map - fixes - Fixes and trek with receiver to jump bear - 13 different bears.

TRACKING SYSTEM (con't)

18. Tracking "Bruno" - Four to five day trips, 41 days, fall range separate from summer one.
19. Airplane - Bears lost - loop on wing strut - 12-20 miles range.

RANGES AND MOVEMENT

- ✓ 20. Map showing concentration - Movement of bears to open land and to dumps. *Park my. affects grizzlies in + not forests in 3 states.*
- ✓ 21. Bear at dump - Refuse from Park visitors, some dumps go back 80 years. Evolution of a home range.
- ✓ 22. Grizzlies concentrated - census, ³²⁴ ~~491~~, total man hours censusing ~~34,370~~. *Min. of 175 grizzlies*
~~11,340~~
- ✓ 23. Range field map - Delineation ranges - one grizzly instrumented 8 consecutive years. Evolution of a home range.
- ✓ 24. Range map - 12 homeranges, 9 seasonal ranges. *1965-27 sq. mi*
- ✓ 25. Range map 202 - Yearling with mother, 2 year old alone. *1966-125 " "*
shot 1967-3 1/2 yrs
26. B & W Range map - overlapping ranges, lack of territoriality, social hierarchy.
- ✓ 27. Moving across lake - Homing, returning to ranges, "Ignatz" #170 34 airline miles in 62 hours.
- ✓ 28. Female #40 swimming river - Extension of range, food, yearling. #14 crossed Yellowstone river 3 times in 10 days. #34 and family 11 crossings in month of August.
- ✓ *Fighting* 29. Numerous grizzlies on carcass - Animals dying, used to move and concentrate bear.
- ✓ 30. Map - movement to kills - 3 days, wind, ripening. *18.5 mi*
carcass
31. Grizzly heading for day bed - In summer, rest during day, fall and spring constantly foraging.
- ✓ 32. Daybed - dense timber - relation with feeding elk, 100 yards away.
33. Uprooted tree bed - reluctance to leave beds, 40 ft., salivating, urinating.
- ✓ 34. Lined day bed - Jumped av. distance of 125 ft., lining unusual.

RANGES AND MOVEMENT (con't)

35. Daybed in snow - Large boar alone, Sows bed with cubs and yearlings.

ACTIVITY

36. Bear fighting - activity, social hierarchy, dominant boar, mate June and July.
37. Activity graph - motion sensing or activity transmitter - senses motion by a peizoelectric transducer.
38. Bear in water - Different activity, night crossings of rivers.

VEGETATION TYPES

39. Veg. type graph- Open country and timber - tubers, mice; pine nuts.
40. Grizzly - Veg. type - Combination of types - digging.
41. Map grizzly #14 - Timber in day, open country at night.
42. Coming out of hibernation - *Inge* -long life transmitters on-off, 1 year.

FOODS

43. Sedge - shoots early spring food
44. Sedge - Bears graze a lot - omnivorous feeders.
45. Marian on buffalo (summer) - carrion, tracking, carcass defence.
46. Carcass - bear and coyote - Bury carcass, coyotes get leavings.
47. Squirrel cache - Robbing to get nuts.
48. Lodgepole bark - #75, near daybed.
49. Yampa - tuborous plants, Helianthus, Camas.
50. Melica spectabilis - Grass bulk, tear up frozen ground
51. Tracking - diggings - Radio allows bear and man to meet time and place of choosing.
52. No. 50 mousing - catching microtus, peak pop., grizzlies in open.
53. Microtus - Pop. reduced by grizzlies, coyotes, hawks, and owls.

MAN-BEAR RELATIONSHIPS

- 54. Scar Faced Bear - May be belligerant if disturbed.
- 55. Bear standing - Charging, rise up to get scent, sight poor.
- 56. Feeding young grizzly - Hand feeding makes bear dangerous.
- 57. Worms - Campground bears, Mother and cub - Females if startled protect young. ^{57a}
- 58. Mother and cub - Females if startled protect young.
- ✓ 59. Approaching bed - den - Bear roared, false charge, ran.
- 60. Up tree- went up tree - grizzlies don't climb.
- 60A Claws - Long claws for digging.
- 61. Canyon den site 202 - isolated, talus rock.
- 62. Looking down on den - 2 dens, yearling, 2 year-old-improved.
- ✓ 63. Rocky den - All others in soil, dig own den, no use of natural shelters.
- 64. Map - 202 den sites, center , relation to campground.

DENS

- ✓ 65. Putting on collar - Fall instrumenting of #40.
- 66. Marian moving (snow) - Prehibernation movements.
- 67. Bear moving denward - Start den digging September.
- 68. Carcass in snow - Final storm even leave food.
- ✓ 69. Tracking snow - All enter same time (storm) varies by 1 month.
- ✓ 70. Tracking snow - Altitude 8-9,000 feet.
- 71. Marking map - getting oriented in lodgepole.
- ✓ 72. Camping - Treks of 3-5 days.
- ✓ 73. Den 164 - First den located, bear in den, did not return.
- 74. Den 40 - Sow and Cub (4 dens) base of trees, north slope.
- 75. Den 187 - Facing north.
- 76. Inside view 164 den - Roots as roof, collapse in late spring.
- 77. Tailing pile 164 den - Act as bed platform - signal on-off.

78. Caved-in den - Former den, #164.
- ✓ 79. Aborted den - Jack- Roots too close, wedged rock #202.
80. Number 40's den and 101 - Companionship of 40 and 101 at den. Breeding cycle 3 years - altered.
81. Number 101's den - abandoned - 1.5 mi. from #40.
82. Den of 101 next year - scenery - usual den areas #40 and 101 16 miles apart.
83. Tracking 101 - Approached den 150 feet
84. First den 101 - abandoned, large pile of boughs.
85. Den and bed of #40 - Sow and yearlings side by side - den wide.
86. Same den in December - Lethargic, moved and growled.
87. Spring den entrance #40 - Covered with snow.
88. Bed in den - bough bed, no excretions.
89. Bough bed on snow - Emergence late March, Slept under snow. Crust on snow.
90. Den diagram - Heat Trap.
91. Den diagram - Constant environment 28 - 32° F.
92. Den map - Concentration, ridge or slope facing north.
93. Automatic equipment - Chart and magnetic tape recording - physiological monitoring.
94. Black bear den - Body temperature in hibernation.
95. Black bear body temperature - Thermistor probe.
96. Graph - Circadian rythms - Environmental conditions, microclimates.
97. Satellite diagram - Use of Nimbus satellites. *Grizzly next*
98. Hauling black bear out - Immobilized, rectal transmitter.
99. Den - Instrumented temp and light transducers.
100. Satellite antenna - Interrogates twice/24 hours.
101. Grizzlies in snow - Transmitters small enough to track grizzlies, polar bear etc.

DESIGNATION OF NO.	SEX	GRIZZLY AGE	DEN DIGGING ACTIVITY	DATE OF FINAL MOVEMENT TO DEN AREA	WEATHER CONDITIONS PREVAILING	TEMP. °F. MAX. MIN.	DATE GRIZZLY ENTERED DEN	WEATHER CONDITIONS PREVAILING	TEMP. °F. MAX. MIN.
164	Young adult female	--	Prior to final trek to den	1963 November 4	Snowing, 4-6 inches on ground	36 28	November 5	Snow storm	31 16
150	Adult female with 3 cubs	--	Prior to final trek to den	1963 November 4	Snowing, 4-6 inches on ground	36 28	November 4	Snow Storm	36 28
40	Female with cub	6 1/2	September 8 (2)	1964 November 1 New den	Snowing, 12-18 inches on ground	45 32	November 10	Snow Storm	40 24
158	Male Yearling with adult sow and litter-mates	1 1/2	Prior to final trek to den	1964 October 29-30	Snowing, 12-18 inches on ground	58 38	November 10	Snow Storm	40 24
40	Adult female pregnant	7 1/2	September 3	1965 October 15-16	Snowing, 3-4 inches new snow	54 30 41 30	November 11	Snow Storm	43 28
202	Weaned Yearling male	1 1/2	October 27-29. No previous preparation	1965 October 15 left regular haunts	Snowing, 3-4 inches new snow	54 30			
				October 25-26 Moved to den site	No snow Clear	55 26 63 25	November 11	Snow Storm	43 28
88	Weaned Yearling male	1 1/2	After October 15	1965 October 15	Snowing, 3-4 inches new snow	54 30	Probably November 11	Snow Storm	43 28
40	Adult female with 2 cubs	8 1/2	Prior to final trek to den November 2 Some digging	1966 November 15	Snowing, 12 inches snow on ground	40 20	November 21	Snow Storm	38 26
202	Young male	2 1/2	October 10-11	1966 November 6	Snowing, 5 inches snow on ground	38 29	November 21	Snow Storm	38 26
101	Adult female with 1 cub	9 1/2	Some digging November 8	1966 November 14	Snowing, 10-12 inches snow on ground	45 24	Probably (1) November 21	Snow Storm	38 26
120	Adult female	--	Prior to final trek to den	1966 About November 1	Snowing. Snow on ground	40 6	Probably November 21	Snow Storm	38 26
187	Adult female pregnant	4 1/2	September 16	1967 October 27	Snowing	51 10	Probably (1) November 19	Snow Storm	32 25
101	Adult female 1 yearling	10 1/2	Approximately October 11	1967 October 27	Snowing	51 10	Den abandoned November 2-6		
101	Adult female 1 yearling	10 1/2	November 7-11 New den	1967 November 2-6 moved to new den site	Snowing, 10-12 inches snow on ground	51 10	New den November 19	Snow Storm	32 25

1. Den abandoned. New den not located

2. Den abandoned. New den located

DESIGNATION OF GRIZZLY NO.	SEX	YEAR DEN USED	DEN LOCATION	VEGETATION TYPE	SOIL STRUCTURE	DEN ELEVATION	SPECIES DEN TREE	DEN CHAMBER L W HT	MEASUREMENTS ENTRANCE L W HT	TOTAL LENGTH	DEN LINING
									INCHES		
164	F	1963*	Upper Alum Creek	Lodgepole Pine	Soft earth	8,200	Lodge- pole	59 53 48	60 17 40	119	Conifer boughs
158	M	1964	Upper Trout Creek	Lodgepole Pine	Packed soil Gravel layer	8,400	Spruce	64 60 60	32 30 42	96	Conifer boughs
40	F	1964	Upper Alum Creek	Lodgepole Pine Spruce-Fir	Packed soil	8,200	Spruce	48 42 48	36 30 30	84	Conifer boughs
40	F (3)	1965	Upper Alum Creek Beach Lake	Lodgepole Pine	Packed soil	8,200	None	54 54 36	66 33 21	120	Grass Moss Rootlets
40	F	1966	Lower Trout Creek	Lodgepole Pine Spruce-Fir	Loose soil	8,000	Dead Stump	60 85 28	30 17 20	90	Conifer boughs
202	M	1965	Yellow- stone Canyon	Spruce-Fir	Rocky (talus)	7,800	Log (1)	47 43 26	-- -- --	66	Conifer boughs
202	M	1966	Yellow- stone Canyon	Spruce-Fir	Rocky (talus)	7,800	Log	43 37 28	-- -- --	63	Conifer boughs
101	F	1966	Lower Trout Creek	Lodgepole Pine	Sandy soil	8,000	White- bark Pine	54 48 30	12 14 36	66	None (2)
101	F	1967	Hedges Peak	Spruce-Fir Whitebark Pine	Packed soil Rocks	9,200	Dead Spruce	63 56 40	45 15 54	108	Fir boughs
187	F	1967	Ice Lake	Lodgepole Pine	Packed soil	8,100	White- bark Pine	-- -- --	36 21 27	--	None (2)
40	F	1968	Upper Trout Creek	Spruce-Fir	Packed soil	8,200	Spruce	68 54 30	38 24 --	106	Conifer boughs

1. Attempted earlier to dig den at base of tree
 2. Den abandoned before lining
 3. Female pregnant
- * Signs of use the previous year

DESIGNATION OF GRIZZLY NO.	SEX	YEAR DEN USED	DEN LOCATION	VEGETATION TYPE	SOIL STRUCTURE	DEN ELEVATION	SPECIES DEN TREE	MEASUREMENTS						TOTAL LENGTH	DEN LINING
								CHAMBER			ENTRANCE				
								L	W	HT	L	W	HT		
INCHES															
164	F	1963*	Upper Alum Creek	Lodgepole Pine	Soft earth	8,200	Lodge- pole	59	53	48	60	17	40	119	Conifer boughs
158	M	1964	Upper Trout Creek	Lodgepole Pine	Packed soil Gravel layer	8,400	Spruce	64	60	60	32	30	42	96	Conifer boughs
40	F	1964	Upper Alum Creek	Lodgepole Pine Spruce-Fir	Packed soil	8,200	Spruce	48	42	48	36	30	30	84	Conifer boughs
40	F (3)	1965	Upper Alum Creek Beach Lake	Lodgepole Pine	Packed soil	8,200	None	54	54	36	66	33	21	120	Grass Moss Rootlets
40	F	1966	Lower Trout Creek	Lodgepole Pine Spruce-Fir	Loose soil	8,000	Dead Stump	60	85	28	30	17	20	90	Conifer boughs
202	M	1965	Yellow- stone Canyon	Spruce-Fir	Rocky (talus)	7,800	Log (1)	47	43	26	--	--	--	66	Conifer boughs
202	M	1966	Yellow- stone Canyon	Spruce-Fir	Rocky (talus)	7,800	Log	43	37	28	--	--	--	63	Conifer boughs
101	F	1966	Lower Trout Creek	Lodgepole Pine	Sandy soil	8,000	White- bark Pine	54	48	30	12	14	36	66	None (2)
101	F	1967	Hedges Peak	Spruce-Fir Whitebark Pine	Packed soil Rocks	9,200	Dead Spruce	63	56	40	45	15	54	108	Fir boughs
187	F	1967	Ice Lake	Lodgepole Pine	Packed soil	8,100	White- bark Pine	--	--	--	36	21	27	--	None (2)
40	F	1968	Upper Trout Creek	Spruce-Fir	Packed soil	8,200	Spruce	68	54	30	38	24	--	106	Conifer boughs
							1. Attempted earlier to dig den at base of tree								
							2. Den abandoned before lining								
							3. Female pregnant								
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