SUSITNA HYDROELECTRIC PROJECT

PHASE II PROGRESS REPORT

BIG GAME STUDIES

Vol. VI. Black Bear and Brown Bear

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I. SUMMARY. Information presented in earlier reports is updated in this report using information collected during the 1984 field season. In most cases these data are presented without discussion additional to that already presented in earlier reports. All of these data will be reanalyzed for the final report due in 1986. New analyses of the following topics are presented in this report.

Brown bear use of impoundment proximity polygons including the area within the proposed impoundment, within the area from the shoreline of the proposed impoundment to 1 mile distant, and from 1-5 miles distant from the impoundment shoreline were analyzed using the Chi Square statistic to determine whether the number of point locations in each of these 3 zones differed significantly from expected values based on the surface area of each zone. Data from 1980-1984 were lumped for this analysis. Brown bears used these 3 zones significantly differently than expected for all months lumped as well as just for the spring months considered separately. These differences were found for male brown bears as well as for females except that no differences from expected values were observed for brown bear females during the period from 1 July-March 31. Brown bear females accompanied by cubs-of-the-year

also showed no differences from expected values in their use of these 3 impoundment proximity zones. During years when they did not have cubs-of-the-year, these same individuals showed significant differences in their use of these 3 zones than they did when they did have cubs-of-the-year. This suggests that females during years when they are accompanied by cubs-of-the-year behave differently than they do when unaccompanied by newborn cubs. In all cases where significant differences between observed and expected values where found, the observed values for use of the area which would be inundated by the proposed Watana impoundment were greater than the expected values indicating positive selection by bears for the area which would be inundated. These analyses will be refined using vegetation-type categories in the final report using the vegetation map prepared in 1985.

Similar analyses for the black bear point-location data revealed that black bears are even more highly dependent on the impoundment zone than are brown bears. Overall 42% of all black bear point locations in the Watana dam impact area were in the area that would be inundated by by the proposed Watana Impoundment. This value was highest in May and June, as for brown bears.

Brown bear and black bear density estimates were obtained in spring 1985 using a newly-developed procedure. A description of the technique is presented. A black bear density of approximately 10.8 square kilometers/bear was obtained for that portion of the study area considered to be black bear habitat(95% CI=7.0-16.2 sq.km./bear). The preliminary density estimate for brown bears was 34.4 sq.km./bear(95%CI=22.8-50.0 sq.km./bear). These preliminary estimates will be refined for the final report.

Brown bear use of Prairie Creek during the salmon spawning period was evaluated using capture-recapture techniques. Brown bear move to Prairie Creek in late June from a documented area of almost 8,000 square kilometers. During 2 surveys estimates of 48 and 33 bears were obtained. Confidence intervals(95%) for this estimate indicate of a maximum of 80 bears use Prairie Creek. This estimate is for bears 2.5 years or older, inclusion of younger age classes would result in a larger estimate. This area around Prairie Creek is the most clearly identifiable area of critical habitat for brown bears in the study area and its potential for use as mitigation for the brown bear losses that will result from construction of the impoundment is discussed.

Brown bear predation rates of 3 moose calves/intensively-monitored radio-marked bear were observed in spring 1985. Black bear predation rates on were lower than for brown bears. Black bears killed at least 2.1 moose calves/100 visual observations compared to 5.5 for brown bears.

II. TABLE OF CONTENTS

IV. LIST OF TABLES

IV. INTRODUCTION AND ACKNOWLEDGEMENTS

This is the third annual progress report of Phase II black and brown bear studies that are being conducted as part of impact assessment work for the proposed

Susitna Hydro-electric project. These studies are being conducted by personnel within the Alaska Department of Fish and Game under contract to the Alaska Power Authority. A through discussion of impacts mechanisms was presented in the Phase I Final Report(Miller and McAllister 1982) and the reader is referred to that report for a discussion of these mechanisms. Some additional analyses of important features of these studies were presented in earlier Phase II progress reports as well (Miller 1983 and 1984) and these discussions are not repeated here. All results will be presented and discussed in the Phase II final report currently in preparation.

In this report an new analysis of data collected during the period 1980-1984 on bear use of the proposed impoundment areas is presented (see section VI-D for brown bears and section VII-H for black bears). New data and analyses on bear predation on ungulates in the study area are also presented in this report. Additional discussion on the importance of Prairie Creek salmon resources to brown bear populations in the study area and the potential to mitigate for impoundment-related losses to brown bear habitat by protection of Prairie Creek is presented in Section VI-H. With these exceptions, the information presented in

this report is primarily an update of the data and discussions presented in previous reports.

Many individuals contributed to the Su-Hydro bear project in 1984. Of primary importance was Dennis McAllister(ADF&G) who was of invaluable assistance in all portions of the project, especially the fieldwork. My supervisor, Karl Schneider, also made many valuable contributions. Many ADF&G employees made valuable contributions to many different aspects of the project including: Warren Ballard, Jack Whitman, Al Franzman, Charles Schwartz, Craig Gardiner, Bill Taylor, Herman Griese, Enid Goodwin, Mark Chihuly, SuzAnne Miller, Bob Tobey, Jim Lieb, Earl Becker, Danny Anctil, Tammy Otto, Polly Hessing, Bob Cassell, Larry Aumiller, Paul Smith, Carolyn Crouch, Susie Lawler, and Penny Miles. Granville Cooey(Harza Ebasco) was, as always, of great assistance in accomplishing what needed to be done. Craig Lofstedt(Kenai Air Alaska) flew the helicopter during the tagging portion of this work and several pilots for Air Logistics flew helicopters at other times. Larry Rogers(Kenai Air), Al and Jerry Lee(Lee's Air Taxi), Harley McMahan(McMahan Flying Service), and Don Deering flew fixed wing aircraft at various times. Bruce Barrett and his staff conducting Su-Hydro fisheries studies were of great help in providing logistic support during the downstream scat collection

portions of this study. Special thanks are due to Rick Halford for permitting us to use his strip at Susitna Lodge to store our aviation fuel. Robin Sener(LGL and associates), Randy Fairbanks(Harza Ebasco) and Richard Fleming(APA) also assisted in various ways. No doubt many other assisted also that I've forgotten to mention and I offer these people my thanks and apologies for neglecting them.

V. METHODOLOGY

Methods used followed those described by Miller and McAllister (1982), Miller(1983 and 1984). Where new or different techniques were utilized in 1984, these are discussed in the text along with the results.

Monitoring schedules were disruped in 1984 because of intensive, daily or twice daily, monitoring that was conducted on 15 May through 25 June and again on 23 July through 1 August. Other flights were conducted on 3, 18, and 30 April, 10 May, 7 and 22 June(downstream only), 12-16 July, 13-14 and 27 August, 2 and 6 September, 1, 11, and 24 October and 7 November. Various obsevations on individual bears were collected at other times in addition as conditions permitted.

Techniques used in conducting a brown bear census at Prairie Creek during the king salmon spawning period are presented in Section VI-H.

No replication of the black bear census effort, using mark-recapture survey flights was conducted in 1984(see discussion in Miller 1984) but a new technique for estimating density of both species was conducted in spring 1985. This procedure and the prelimninary results are discussed in Sections VI-E(for brown bears) and VII-C(for black bears).

VI. RESULTS AND DISCUSSION--BROWN BEARS

A. Sex and age composition of study animals.

Following the May 1984 tagging effort 37 brown bears were radio-marked including 7 cubs-of-the-year("coy")(with females 423, 281, 340, and 337), 4 yearlings(with females 299 and 420), 20 adult females(3 of these in the downstream study area) and 6 adult males(1 of these in the downstream study area). Capture data from 1980-1984 are given in Table 1. During the monitoring period in 1984 the 4 radio-marked cubs with females 340 and 337 all survived, the one radio-marked cub in the litter of 4 with 423 was lost to unknown causes, one of the cubs with 281 was lost to brown bear predation and the other to unknown causes. All 4 of the radio-marked yearlings survived. The bodies of the cubs lost to unknown causes were not found. Circumstances of these losses suggest that these cubs may have been swept away by swift rivers or streams.

B. Population Biology and Productivity--Brown Bears.

Based on reproductive status and activity in 1983, Miller(1984:78) predicted the spring 1984 reproductive status of 20 radio-marked brown bear females. The

predictions and the observed spring 1984 status is given in Table 2.

In similar fashion the spring 1985 reproductive status of 20 radio-marked brown bear females was predicted in January 1985. These predictions and the results observed in spring 1985 are given in Table 3.

Litter size information for brown bear litters of cub-of-the-year during the period 1978-1984 are given in Table 4, for litters of yearlings in Table 5 and for litters of 2-year-olds in Table 6. Reproductive histories of radio-marked females during this same period are given in Table 7.

A summary of known losses from brown bear litters of cubs and yearlings is given in Table 8. A total of 39% of cubs accompanying radio-marked females have been lost compared to 29% for yearlings(Table 8).

Measurements of brown bear cubs and yearlings handled in the project area are given in Tables 9 and 10, respectively.

C. Brown bear home range and density estimates.

No additional analyses of brown bear home range sizes were conducted using the data from 1984. For annual home range sizes during the period 1980-1983 see Table 19 in Miller(1984:98).

No additional estimates of brown bear density were conducted in 1984. The best available density estimate for the Su-Hydro study area is 1/17 square miles(Miller and Ballard, 1982) as was discussed in Miller and McAllister(1982). Other methods of estimating population size and density were presented in Miller(1984), but these were concluded to be highly inaccurate. An intensive effort to estimate brown bear and black bear densities in the Su-Hydro study area was conducted in spring 1985, an analysis of these data are currently underway and will be presented in the final report of this project(Miller, in prep.).

Updated information on numbers of Susitna River crossings by radio-marked brown bears are presented in Table 11.

D. Use of Impoundment Impact Zones by Brown Bears.

Miller and McAllister(1982:58-60) provided a preliminary assessment of brown bear use of impoundment area proximity zones, this analysis was combined with

data collected subsequently for the analysis presented here. Three zones were identified for each impoundment area: Within the area that would be flooded by the proposed impoundments(zone 1), within 1 mile of the high water mark of the proposed impoundments(zone 2), and from 1 to 5 miles from the high water mark of the proposed impoundments(zone 3). Data collected further than 5 miles from the proposed impoundments(zone 4) is also reported but not included in the analysis because, of course, the size of this zone is infinite. A vertical north-south line was drawn to separate the 5-mile polygons of each impoundment which would, otherwise, have overlapped. An illustration of these impoundment impact zones was presented in Figure 3 of Miller and McAllister(1982:49). The purpose of this analysis was to determine whether bears were selecting for the impoundment area and at which periods of the year this occurred. Chi square analyses were used to make this determination under the null hypothesis that the number of point locations found in each of these 3 zones was in the same proportion as the area in each zone. Seasons considered included "spring"(April 1-June 30) and the rest of the year.

Brown bears used the 3 impoundment significantly differently than expected for all months lumped and in the spring(Table 12). Use of the impoundment zone was

over twice expected values(Table 12). No significant variation from expected values was observed during the period July 1-March 31(Table 12).

Brown bear males, considered separately,also used the 3 impoundment zones significantly differently than expected under the null hypothesis(Table 13). In all months and in both periods use of the impoundment zone was higher than expected values(Table 13).

All brown bear females, considered separately, also used the 3 impoundment zones significantly differently than expected under the null hypothesis(Table 14). This difference was significant for all months lumped and in spring period, but did not differ from expected values during the July 1-March 31 period(Table 12).

When a similar analysis was done for brown bears females with cubs-of-the-year(coy), no significant variation from expected values were observed for either all periods lumped or for either of the two time periods(Table 15). This is because these bears tend to stay at higher elevations, well away from the impoundment area during years when they have newborn cubs. I suspect that this behavioral trait is designed to reduce predation on their cubs from other brown bears, especially adult males, that are concentrated in

these lower elevation habitats early in the year. To test this hypothesis I compared the use of these 3 impoundment zones(both impoundments lumped) during years when the same set of females had cubs of the year with the years when they did not(Table 16). During years when they had cubs these bears utilized these 3 zones significantly differently than they did during years when they did not have newborn cubs and use of the impoundment zone was less than expected when these females had cubs(Table 16).

Similar analyses were conducted for observations within the 3 proximity zones of the Devils Canyon impoundment but because of the smaller sample of point-locations in this area and because of the much smaller area that is anticipated to be flooded by the Devils Canyon impoundment, breakdowns by season were not possible. Use of these 3 zones(all months lumped) was significantly different for females without coy and for all bears lumped, it was not significantly different for males(Table 17). The most significant deviations from expected values were observed in zone 3 which was used more than expected. Zone 1, the impoundment area, was also used more than expected but had only slight use altogether(Table 17).

E. Brown bear density estimation procedures and results

No additional work on brown bear density estimates was accomplished in 1984. Previous work was summarized in last year's progress report concluded that the best density estimate for the study area available was one bear per 17 square miles(Miller and Ballard, 1982) based on work conducted in 1979 in an area adjacent to the Su-Hydro study area(Miller 1984).

Work conducted in spring 1985 was designed to provide an improved density estimate for brown bears in the Su-Hydro study area. These data have been incompletely analyzed at this point but it appears that the density estimate that will result will be approximately one bear per 14 square miles(Miller in prep.). These data will be completely reported in my final report but the techniques followed will be outlined here.

The basic technique followed was the Lincoln-Peterson Index using the ratio of marked to unmarked animals seen during census flights in fixed-wing aircraft(PA 18). This is a variation of the technique reported by Miller and Ballard(1982) and of the technique I reported in Miller(1983). "Marked" animals were those with functioning radio transmitters at the initiation

of the census period, all other bears seen during the census period were considered unmarked animals and were captured when they were spotted and were marked with radio-transmitters or visual markers. Newborn cubs and yearlings were classified the same as their mothers, either "marked" or "unmarked". Consecutive days of search effort were combined to provide a series of independent estimates over time. The number of marked animals present increased in the later periods relative to the earlier periods. This basically follows the procedure for developing a Schnabel estimate.

The unique feature of the estimation procedure followed in spring 1985 was that we tested the assumption that the population of bears was "closed" to immigration and emigration and made a correction for the demonstrated absence of closure. This testing was accomplished by flying the periphery of the search area each day and determining whether the radio-marked bears were present in the search area or were absent. The number of marks "present" during the search effort was, correspondingly, adjusted to be the fractional value represented by the proportion of times the individual bear was determined to be present in the search area; if a bear was present half of the time, for example, it was considered to be 0.50 of a marked bear present in the search area. Bears with just visual marks were

assigned fractional presence values based on the average values for the radio-marked bears of the same sex and age group. Calculation of population size followed using the standard Lincoln Index and associated formulae. This population value was divided by the size of the search area to derive a relatively unbiased estimate of density. Corrections for "periphery" effects, which result from lack of closure of the population, were not needed following this procedure because this factor was taken into account in determining the number of marks present. Following this procedure means that the most seriously violated assumption is no longer lack of closure but unequal catchability. Methods of correcting for violations of this assumption are currently under investigation.

Density estimates, following this procedure, were accomplished simultaneously for both black and brown bears during spring 1985.

Using these procedures a preliminary brown bear density estimate of 34.4 sq.km./bear was obtained for the Su-Hydro study area. Confidence intervals(95%) for this estimate were approximately 22.8-50.0 sq.km./bear. A thorough analyses of these data will be presented in the final report These results are preliminary and tentative.

F. Characteristics of brown bear denning ecology

Updated data for the winter of 1984/85 on of brown bear denning habits in the study area are presented in tables without additional discussion. These data were previously discussed in Miller(1983) and in previous reports and recent data support the conclusions drawn earlier. One brown bear(pregnant Female 396 with 2 newborn cubs in 1985) denned at an atypically low elevation(2,000 feet) site during the winter of 1984/85. This location would have been inundated had it occurred in the vicinity of the Watana Impoundment but it occurred in the vicinity of the Devils Canyon Impoundment so earlier conclusions that no known brown bear den sites would be inundated by the proposed impoundments remain valid. I expect that this low elevation den site is atypical for brown bears in study area.

Updated tables giving the characteristics of dens visited through the winter of 1983/84 are presented in Table 18. Entrance and emergence dates for the winter of 1983/84 are given in Table 19, equivalent data for previous years of study were presented in earlier reports. Entrance dates for the winter of 1984/85 are presented in Table 20. Data on the distances between

den sites used by the same individual in successive years are given in Table 21. These data indicate a high level of fidelity to the same general denning area in successive years by the same individual(a mean difference of only approximately 4 miles, Table 21).

G. Harvest of marked brown bears in Su-Hydro study area

Updated data on the harvest of marked brown bears in the Su-Hydro study area are presented in Tables 22-24B. Over the period of study, the proportion of the population harvested each year appears to be increasing(Table 24B) but these data should be cautiously interpreted. A minimum of 13% of the population of bears marked in the Su-Hydro study area were reported harvested by hunters in 1984(Table 24A).

H. Brown bear use of the Prairie Creek area

Each year many brown bears in the Su-Hydro study area move in July and August to a tributary of the Talkeetna River running out of Stephan Lake, Prairie Creek. The purpose of these movements is the run of king(chinook) salmon in this creek. These salmon serve as a rich food source for bears. Sport fisheries biologists with the Department of Fish and Game report that this area

supports the most concentrated king salmon spawning area in the upper Cook Inlet region(Larry Engle, personal communication). Radio-marked brown bears have been documented moving from an area of 7,894 square kilometers to utilize Prairie Creek salmon resources(Miller 1984:27). The actual area of attraction to brown bears is much larger than this because these data are biased as a result of tagging radio-marked bears only in the Su-hydro study area which is north and east of Prairie Creek, bears moving to Prairie Creek from south and west directions would have no chance of being radio-marked.

The proportion of radio-marked bears in the Su-Hydro study area that have been documented moving to Prairie Creek to fish for salmon has ranged from 13% in 1981(a year when little monitoring was done as a result of poor flying conditions) to 38% in 1984(Table 25). This proportion appears higher for radio-marked males(50% in 1984,excluding dispersers) than for radio marked females(33% in 1984)(Table 25). This is probably because of the larger home ranges of radio marked males(Miller and McAllister 1982).

In connection with intensive monitoring of radio-marked brown bears in spring and summer of 1984 to determine predation rates on ungulate calves(see the following

section of this report), efforts were made to census the number of bears using Prairie Creek during the salmon run. This number is difficult to determine from direct counts because of the exceptionally dense vegetation along the shores of Prairie Creek. This vegetation makes it very difficult to spot the bears from the air, they need only to move a few feet from the creek and they are well hidden from sight. Correspondingly we attempted to census the bears in this area using the ratio of radio-marked to unmarked bears spotted during intensive search efforts along the length of the creek between upper Murder Lake and the Talkeetna River. Marked bears spotted were identified by their radio-frequencies but radio-tracking gear was not utilized in finding the bears during the search effort. The search pattern flown was a circular one overlapping the Prairie Creek from both sides and following up the tributaries on both sides of Prairie Creek up to the limit of where salmon could reach. Subsequent to the search effort, radio-tracking gear was utilized to locate all radio-marked bears in the general area to determine how many were present in the area previously searched. Pilot Al Lee(Lee's Air Taxi) flew these surveys with myself present as spotter and radio-tracker.

Results of 2 surveys, flown on 29 July and 1 August, are presented in Table 26A. On July 29 an estimate of 48 bears(95% confidence interval=12-80) was obtained, on August 1 an estimate of 33 bears(95% confidence interval=10-62 bears) was obtained(Table 26A). This estimate includes only bears that were not accompanied by their mothers(or bears at least 2.0 years old), an estimate including these subadults would be 30-40% higher. The large confidence intervals of this estimate result from a low number of marked bears present in the search area when the census was conducted(only 4-5, Table 26A). Obviously the lower limit of the confidence interval is nonsense as more bears than this value were actually seen on each flight(Table 26A) so a realistic lower limit would be truncated at the number of bears actually seen. Similar surveys are planned for July 1985.

Equivalent data were collected during summer 1985 during the period 23-27 July using replicated morning and evening flights each day in a Piper supercub(PA 18) flown by Harley McMahan with myself as observer. On 6 August another flight was conducted in a Cesna 180 flown by Larry Rogers with myself, Randy Fairbanks and Richard Fleming as observers, this flight was incomplete at the lower end of Prairie Creek because of fuel shortage. The August 6 flight was the poorest in

terms of observability because of the larger airplane and increased number of observers however it may have provided the best estimate because of the larger number of marked bears that were present(Table 26B). The data from these 1985 flights are included in this report (Table 26B) although they are incompletely analyzed.

These surveys are designed estimate the number of bears using Prairie Creek and also to provide baseline data on this value which can be used to document the anticipated decline in bear use of Prairie Creek which will occur when the impoundment is built. This documentation will result from replicated surveys flown subsequent to construction when the impact of development has resulted in the anticipated exclusion of many brown bears from this resource. This exclusion will result, in part, from increased numbers of non-sport brown bear kills by the increased number of recreational users who will have access to the area subsequent to construction of access routes from the Denali Highway. More important, however, will be the effects of disturbance exclusion whereby brown bears will abandon the area because of the anticipated large increase in numbers of humans using the area.

Prairie Creek is the only clear example of critical habitat for brown bears that has been found in the

vicinity of the proposed hydroelectric project. As such, protection of this area from the competitive exclusion impacts, mentioned above, would appear to offer an excellent opportunity to mitigate for the losses to brown bear habitat that will occur as a result of the project. This mitigation could be achieved if the area surrounding Prairie Creek were obtained by the state and put into an appropriately protective land-use designation such as a State Game Refuge. This protection would not result in any absolute increase in numbers of brown bears that could be used to offset the losses that will be caused by the project, no mechanism that would accomplish such an increase is known. However, protection of Prairie Creek from human competitive exclusion impacts would help maintain larger populations of bears than would be able to exist in this area without such protection of Prairie Creek. As this is the only kind of mitigation which is possible for the losses that the project would cause to brown bear populations in the study area, protection of Prairie Creek as a food source for salmon-fishing brown bears should receive the attention of mitigation planners. That that factors necessary to adequately protect Prairie Creek from exclusion impacts include:

1. Restrictions on human use of the area between 1 July and 15 August, at least; and

2. Minimal human development and impacts in the larger area surrounding Prairie Creek, such as the Fog Lakes area, through which bears must pass to get to Prairie Creek.

It is noteworthy that the recreational plan currently under consideration as part of the FERC license application is incompatible with either of these requirements. Among other things it is highly questionable, for example, whether there would be any point in protecting Prairie Creek as a State Game Refuge if road access to the south side of the Susitna River is provided as a result of the project. Such access would almost certainly eliminate the Prairie Creek area as a critical habitat area that would be utilized by brown bears.

I. Brown bear predation rates on ungulates

During spring 1984 selected radio-marked brown bears were monitored twice per day from 29 May through 7 June and once per day from 8 June through 1 July, weather conditions permitting. These data were collected simultaneously with moose calf mortality studies being

conducted as part of the upstream moose project(Ballard and others in prep.). Similar data were collected during once/day monitoring of the same bears during 23 July through 1 August to compare spring and summer predation rates.

During the spring period twenty-six moose calf kills were positively identified for 16 radio marked bears, an additional 8 kills of non-calf moose and 3 age or species unknown kills were also observed(Table 27). This represents a total of 48 known or suspected kills of ungulates by these bears during the spring, approximately 3/bear(Table 27). Females with newborn cubs had the lowest predation rates(1.5 kills of moose calves/100 visuals) and females with yearlings had the highest rates(8.7/100 visuals)(Table 27). The low rates for females with newborn cubs doubtless reflects the elevational separation which typically separates these bears from other bears during the spring(Miller and McAllister 1982). This separation puts most females with cubs away from the area where most other bears are concentrated and also away from the areas where moose calves are being born.

Only one ungulate kill was observed during the summer observation period(Table 28). If the same ratio of visual observations of bears to kills of ungulates that

had been observed in the spring occurred in the fall, then 3.5 kills would have been expected(excludes observations made at Prairie Creek). It appears that ungulate kills by brown bears are more prevalent in the spring than during the summer as would be expected. A more complete analysis of these data will be conducted for the final report.

VII. RESULTS AND DISCUSSION--BLACK BEARS

A. Sex and Age Composition of Study Animals

Following the May 1984 tagging effort 30 black bears (including 13 in the downstream study area) were radio-marked. Capture data from 1980-1984 are given in Table 29. losses of marks and bears left 27 radio-marked bears by spring 1985, 11 of these in the downstream study area.

B. Population Biology and Productivity--Black Bears

Based on reproductive status in 1984, Miller(1984: Table 31) predicted the spring 1984 reproductive status of 19 radio-marked black bear females. These predictions and the observed status of these bears in the spring 1984 are given in Table 30. Similar predictions, during January 1985, were made for the spring 1985 reproductive status of 21 radio-marked black bears. These predictions and the observed results are presented in Table 31. These data are useful in calculating reproductive interval and will be thoroughly evaluated in the final report.

Updated litter size information for black bear cubs is given in Table 32 and for litters of yearlings in Table

33. Updated information on the losses of newborn cubs of radio-marked females is given in Table 34. Updated information on sex ratio and morphometrics of black bear cubs and yearlings is provided in Tables 35 and 36 respectively. Updated information on apparent causes of natural mortalities to black and brown bears is given in Table 37.

C. Black Bear Density Estimates

No additional work on black bear density estimates was accomplished in 1984. For a review of the work accomplished to date on this topic see Miller(1984), Miller(1983) and Miller and McAllister(1982). None of these reports provide an acceptable estimate of black bear density. An extensive effort to provide an accurate and objective estimate of black bear density was made in spring 1985 following the same procedures previously discussed for brown bears(see Section VII C of this report). This effort was successful. These data are currently being analyzed and will be reported in the final report.

A preliminary analysis of these results indicate that the area of 520 square miles searched for black and brown bears contained approximately 39 brown bears and

49 black bears(Miller in prep.). All of this area was brown bear habitat but not all of it was black bear habitat. The portion of the search area that was black bear habitat was determined by plotting the point locations of all radio-marked black bears during the period 1980-1984. These points were used to delineate "black bear habitat" by manually drawing a convex polygon such that all but a few of these points were included. Excluded points represented locations felt to be erratic or point locations outside of typical black bear habitats. The same process was followed to delineate the portion of the whole upstream area that was black bear habitat so that the density estimate obtained in the census area could be applied to this larger area in order to obtain a population estimate for the whole study area.

The census area of 520 square miles contained about 206 square miles(532 square kilometers) that was considered black bear habitat determined in this way. Correspondingly, an estimate of about 49 black bears for this area would represent a density of about 1 black bear/4.2 square miles or 1/10.9 square kilometers. The total area of the upstream study area considered to be black bear habitat was 465 square miles(1203 square kilometers), calculated as outlined above. Applying the above density figure to this area

yields a population estimate of about 111 bears(all sexes and ages). These data are highly preliminary and should be cited with care until final analysis is accomplished. Without doubt some modifications to the figures presented here will occur when the final analysis is completed. It is also noteworthy that this population estimate reflects the number of bears present in spring 1985, not the capability of the habitat to support this many bears. As mentioned in previous reports(Miller 1984 and 1983, Miller and McAllister 1982) it is felt that the current population has declined sharply from the number of bears present in the study area in 1980 and 1981, probably as a result of the poor berry crop in 1981.

D. Berry Abundance

Four transects designed to document changes in berry abundance between years were established in 1982(Miller 1983). These same plots were read in 1983 and in 1984 and these results are presented in Table 39 along with the results from previous years. Fewer blueberries were counted in transects 2 and 3 in 1984 than in the previous year. These data suffer from an inadequate sample size. A subjective appraisal of berry abundance in each of the years of study is presented in Table 40. This appraisal suggests decreased berry abundance in

1984 relative to 1983. Information on the relative abundance of berries in different habitat types is being collected in summer 1985 in association with moose browse inventory studies.

E. Home Range and Movements

Home range data for radio-marked black bears (1980-1983) are presented in Tables 41 and 42 for downstream and upstream bears respectively. Analyses in addition to those reported in Miller(1983) will be conducted for the final report. Annual numbers of river crossings by radio-marked black bears are reported in Table 43.

F. Bear Food Habits

The contents of scats collected in 1984 are presented in Table 44. As discussed in Miller(1984) experimental attempts to develop a technique to differentiate between the scats of black and brown bears were unsuccessful, so in most cases these results are for bears of unknown species.

Most of the scats analyzed were collected in mid-August along the streams and sloughs between Curry and Portage Creek, downstream of the proposed impoundments. These collections were made in this area in order to evaluate

the impacts of expected reductions of spawning salmon in these areas subsequent to construction of the impoundments. This reduction was thought likely to impact bears feeding on these salmon. Of 39 samples collected along these sloughs and streams in 1984 however, none contained identifiable remnants of salmon. These results are equivalent to those reported previously(Miller 1984 and 1983). Also as reported before, berries of devils club (Oplopanax horridus) were the most commonly found item in these scats(Table 44). Salmon were more abundant in these sloughs than they were in 1983(Table 45). This was because 1984 was an even-numbered year when pink salmon are more abundant.

G. Black Bear Denning Ecology

Raw data on the dimensions and other characteristics of black bear den sites found in the study area are given in Table 46. The history of den use by each individual radio-marked bears is provided in Table 47. Some radio-marked bears use the same den sites in successive years and some use dens previously occupied by another radio-marked bear. Correspondingly, a history of known use of individual den sites is provided in Table 48. A total of 82 individual black bear den sites have been identified to date throughout the entire study area, 23

in the Devils Canyon area, 23 downstream of this, and 36 in the Watana impoundment area(Table 48). Dens that were excavated by bears represented 50% of the dens found, 34% of the dens were in natural cavities(caves, rock piles, etc.), and 4% were in trees(Table 48). In the Watana Impoundment area, 20(56%) of the dens discovered would be flooded by the impoundment. In the Devils Canyon impoundment area, only 1(4%) of the dens found would be flooded by the Devils Canyon impoundment(Table 48).

During winter of 1984/85, 13 dens that had been occupied by radio-marked black bears in previous years were revisited and inspected for occupants. None were occupied(Table 48).

Entrance and emergence dates of radio-marked black bears from their 1983/84 dens are provided in Table 49. Entrance dates into 1984/85 dens by radio-marked black bears are provided in Table 50. Emergence in spring 1985 was delayed by late snows, but these data have not yet been compiled.

Conclusions of my earlier reports that the Watana impoundment would impact a significant amount of black bear denning habitat upstream of the site of the Watana dam are supported by these data. The Devils Canyon dam

on the other hand is likely to have only a small impact on black bear denning habitats.

H. Black Bear Use of Impoundment Proximity Zones

Black bear use of nested zones of proximity to the Devils Canyon and Watana impoundments was analyzed using the same methods and procedures previously discussed for brown bears(see section VII-D of this report and Miller and McAllister 1982). Black bear use of the areas that would be inundated by the Watana impoundment was highly significant when compared to the adjacent zone or to the adjacent 2 zones(Table 51). Overall 42% of the observations of radio-marked black bears made in the vicinity of the Watana impoundment were in the area that would be inundated by that dam(Table 51). This percentage value was highest in May and June, the same time period when brown bear use of the impoundment area was highest. No doubt at this time the black bears and brown bears are using the same spring food resources that are available earliest on the south-facing slopes along the Susitna River and its tributaries: carrion, newly-emerged plants, overwintered berries, and moose calves.

This same pattern is not evident for the Devils Canyon impoundment. This is probably because of the very

small area that would be inundated by this impoundment(only 3.3% of the area within 5 miles of the Susitna River along the reach of the River that would be inundated by the Devils Canyon impoundment)(Table 52). In the spring period when the Devils Canyon impoundment zone is most used(May 1-June 30), observed use was lower than expected values for zone 1 for the comparison between zones 1 and 2(Table 52). In the area around the Devils Canyon impoundment the distribution of acceptable black bear habitat is much wider than farther upstream and as a result dependence of the immediate vicinity of the river is less in the lower portion of the study area.

I. Black Bear Predation Rates

As discussed earlier in this report for brown bears(Section VII-I), radio-marked black bears were intensively monitored in spring 1984 and again in mid-summer. Predation rates by black bears on ungulates(Tables 53 and 54) was lower than for brown bears(Tables 27 and 28). Black bears killed at least 2.1 calves/100 visual observations in the spring while brown bears killed at least 5.5/100 visual observations. These are minimum values because not all kills could be observed or identified. These data will be more completely analyzed for the final report, but it is clear that black bear bear predation on moose

calves is significant in the study area and that a complete elimination of brown bears from the study area would not eliminate predation losses to bears. The degree to which black bear predation is additive or compensatory to brown bear predation is not clear from the preliminary data analysis. I suspect that moose calf losses to black bear predation is largely additive to losses to brown bear predation but that if brown bears were greatly reduced in numbers that some compensatory increase in black bear predation would occur. This would be because black bears would probably range more widely and would likely frequent habitats they currently tend to avoid because of the dangers of encountering brown bears in these habitats.

VIII. REFERENCES CITED

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IX. TABLES

Table 1. Brown bears captured in Susitna Dam Studies as of July, 1985

Tattoo	Capture Sex	Age	Wt.	Date	Serial #	Ear Tags	Comments
(277)	F	10.5	225*	4/10/80		1065/1066	w/2 ylgs, not marked, collar shed 80/81 den
(278)	M	9.5	375*	4/19/80		-- --	capture mortality
(279)	M	9.5	400*	4/20/80		1100/1099	collar shed by 6/12/80, recaptured 5/18/83, shot 9/84
280	M	5.5	300*	4/20/80		1097/1098	recollar next spring
214	M	4.5	300*	4/22/80		1072/1071	collar shed 9/9/80, recaptured 6/85
281	F	3.5	250*	4/22/80		16175/15950	not turgid, see 5/81 recapture
282	M	4.5	325*	4/22/80		1079/1080	see 6/82 recapture
283	F	12.5	280*	4/22/80		690/689	w2 @2.5: 284 and 285
(284)	M	2.5	180*	4/22/80		1074/1073	w/283 see 5/5/81 recapture
285	M	2.5	180*	4/22/80		687/688	w/283
286	M	3.5	264	5/1/80		1081/1082	
292	F	3.5	174	5/2/80		1322/1321	Turgid
293	M	3.5	277	5/2/80		1116/1115	
(294)	M	10.5	607	5/2/80		-- --	died on 8/6/81 recapture
(295)	M	12.5	589	5/3/80		1303/1304	collar shed by 5/4/80
299	F	13.5	285	5/4/80		1109/1110	w/2 ylgs, turgid, recaptured 5/7/81
(297)	M	1.5	65	5/4/80		(1301/1302)	w/299, shot by hunter on 9/18/81
298	M	1.5	65	5/4/80		1318/1317	w/299
306	F	3.5	163	5/4/80		1319/1320	turgid
(308A)	M	6.5	480	5/6/80		(1126/1125)	shot 9/83
(308B)	F	5.5	240	5/6/80		1096/1095	turgid(?) - died on 8/6/81 recapture
309	M	12.5	600	5/6/80		1117/1118	collar shed by 5/14/80, recaptured 6/85
(312)	F	10.5	319	5/7/80		1312/1311	w/311
(311)	M	2.5	227	5/7/80		-- --	shot on 9/16/80
313	F	9.5	286	5/7/80		1119/1120	w/314 @2.5
314	F	2.5	154	5/7/80		1049/1050	w/313, recaptured 6/1/85
315	F	2.5	90*	5/7/80		1127/1128	alone, recaptured 5/18/83
(284#2)	M	3.5	125	5/5/81		1074/1073	near 283 w/2c, shot by hunter on 5/18/81
(331)	F	6.5	172	5/5/81		(1296/1295)	w/332 and 333, died August 1982
(332)	M	2.5	79	5/5/81		(1215/1216)	w/331 and 333, shot by hunter on 9/5/82
(333)	M	2.5	67	5/5/81		(1240/1239)	w/331 and 332, shot by hunter on 9/3/81
334	F	10.5	325	5/5/81		1292/1291	estrus, missing in 1982
335	F	3.5	194	5/5/81		1220/1219	recaptured 5/14/83, age changed + 1 '83 tooth
281#2	F	4.5	--	5/6/81		1201/1202	estrus? recaptured 5/15/83
283#2	F	13.5	261	5/6/81		1089/1090	w/338 and 339, recaptured 5/14/83
338	F	0.5	12	5/6/81		1224/1223	w/283, sex switched to female
339	M	0.5	13	5/6/81		1222/1221	w/283, recaptured 6/85, sex switched to male
312#2	F	11.5	280	5/6/81		1300/1299	w/2c @0.5 (not captured), recaptured 5/14/83
313#2	F	10.5	284	5/6/81		1120/1119	w/336, recaptured 5/14/83
336	F	0.5	--	5/6/81		1237/1238	w/313, not drugged (abandoned)
337	F	13.5	321	5/6/81		1294/1293	w/3c reunited on 5/9/81, recaptured 5/14/83
340	F	3.5	190	5/6/81		1225/1218	not estrus, recaptured 5/15/83
280#2	M	6.5	394	5/7/81		1097/1267	w/F 341, recaptured 5/16/83
341	F	6.5	224	5/7/81		(1208/1207)	w/M 280, collar failed, recaptured 6/81
299#2	F	14.5	291	5/7/81		1109/1110	w/2 @2.5 (297 and 298 - not recaptured), not estrus, recaptured 8/6/81
(342A)	M	2.5	220	5/7/81		1228/1227	alone, see 5/25/82 recapture, died 7/84
344	F	5.5	--	5/8/81		1204/1203	w/2 cubs subsequently, recaptured 5/14/83
(345)	M	7.5	495	5/8/81		-- --	capture mortality
(308B)#2	F	6.8	--	8/6/81		-- --	recapture mortality
299#3	F	14.8	--	8/6/81		1109/1110	collar replaced, recaptured 5/18/81

(continued on next page)

Table 1. (continued)

Tattoo	Capture Sex	Age	Wt.	Date	Serial #	Ear Tags	Comments
293#2	M	4.8	--	8/6/81		150.710	1115/1116 collar replaced, recaptured 5/18/83
(294#2)	M	11.8	--	8/6/81		-- --	recapture mortality
347	M	14.8	500*	8/6/81		(1234/1233)	collar shed 9/81, recaptured 6/9/85
(342A#2)	M	3.5	250*	5/25/82		1228/1227	collar replaced, died 7/84
(373)	M	9.5	450*	6/11/82		-- --	no tattoo, w/G283 (F), collar shed 6/83
282#2	M	6.5	350*	6/11/82		529/1643	recapture of marked bear, shed collar, recaptured 5/84
379	F	5.5	300*	6/11/82		1595/1585	w/2@c, Downstream study
(380)	F	15.5	275*	6/12/82		(1588/532)	w/2@1, not captured, shot 9/83
381	F	3.5	200*	6/12/82		533/1592	alone, recaptured 5/18/84
313#3	F	12.5	300*	5/14/83	6259	same	w/2@1
382	M	1.5	66	5/14/83	12546	2135/2134	w/313 and 383, recaptured 5/18/84
(383)	F	1.5	53	5/14/83	12542	(2490/2491)	w/313 and 382, died unknown causes
283#3	F	15.5	--	5/14/83	6340	same	w/cub #3
(003)	F	0.5	--	5/14/83	1024	(1360/1359)	w/283, special cub collar, no tattoo, cub eaten
337#2	F	15.5	--	5/14/83	6309	same	w/385@2
385	F	2.5	60	5/14/83	(15210-12548)	(1695/1694)	w/337, breakaway 5B collar, recaptured 6/85, tags replcd.
(312#2)	F	13.5	350*	5/14/83	(6342)	(1299/1300)	w/386@2, died 5/16/84
386	M	2.5	200*	5/14/83	15212-12545(Imp)	2146/2141	w/312, breakway 5B collar, dispersed
344#2	F	7.5	325*	5/14/83	10445	same	w/2@0, not captured
335#2	F	5.5	--	5/14/83	--	same	no radio in chopper
335#3	F	5.5	236	5/16/83	15276	same	alone, one year added to '81 age based on '83 tooth
388	F	14.5	450*	5/14/83	6988	2478/2477	w/388 and 389@2, recaptured 5/16/84
(389)	M	(2.5)	135	5/14/83	(15214-12544)	2170/2171	w/388 and 390, breakaway 5B collar, died 10/83
390	M	2.5	125*	5/14/83	15211-12543	2148/2147	w/388 and 389, breakaway 5B collar-shed
340#2	F	5.5	250*	5/15/83	(15285)	same	recaptured 5/17/84, collar replaced 6/85
384	F	12.5	300*	5/15/83	15279	2499/2500	w/391, 392, 393@2
(391)	M	2.5	140*	5/15/83	(15213)	(2078/2079)	w/384 et al., breakaway 5B collar, shot 9/84
(392)	M	2.5	140*	5/15/83	(15246)	(2111/2110)	w/384 et al., breakaway 4B collar, shot 5/84
393	F	2.5	105	5/15/83	15247	1589/1598	w/384 et al., breakaway 4B collar
293#3	M	6.5	439	5/15/83	15291	same	--
(394)	F	6.5	250*	5/15/83	(15277)	(1693/1692)	w/cub #4, shot 9/84
(004)	F	0.5	10	5/15/83	--	(1358/1357)	w/394-chewed on, no tattoo, died later
(395)	F	3.5	175*	5/15/83	(15289)	(2415/2416)	alone, regular 6B collar, shot 9/4/83
281#3	F	6.5	325*	5/15/83	(15284)	same	w/2@0 (#5 and #6), recollared 5/17/84
(005)	M	0.5	8.5	5/15/83	(1023)	(1350/134)	w/281, expandable cub collar, no tattoo, eaten
(006)	F	0.5	8.3	5/15/83	(1026)	(1346/1345)	w/281, expandable cub collar, no tattoo, eaten
280#3	M	8.5	482	5/16/83	(15290)	same	recaptured 6/85
396	F	13.5	274	5/16/83	14885	1685/1684	w/2@2 (397, 398)
397	F	2.5	132	5/16/83	--	(2493/2492)	w/396, recaptured 6/4/85
398	F	2.5	135*	5/16/83	--	2105/2104	w/396
399	M	9.5	600*	5/17/83	(15278)	2087/2108	recaptured 5/15/84
400	M	20.5	542	5/17/83	(15281)	2132/2133	recaptured 5/18/84
299#4	F	16.5	275*	5/18/83	15283	same	w/3@0, darted in den, recaptured 5/15/84
418	M	0.5	13*	5/18/83	1024	1347/1348	w/G299, special cub collar, shed 10/83, old #7
419	M	0.5	13*	5/18/83	1025	1342/1343	w/G299, special cub collar, old #8
417	M	0.5	13*	5/18/83	1022	536/535	w/G299, special cub collar, shed 7/83, old #9
(279#2)	M	12.5	700*	5/18/83	(10339)	1653/1100	recapture, previous shed collar, recaptured 5/16/84
315#2	F	5.5	203	5/18/83	15288	same	estrus, alone, just marked previously
403	F	6.5	275*	5/18/83	15275	1564/1565	w/2@0, not captured, Downstream
407	F	4.5	220*	5/19/83	2905	2401/1543	alone, downstream, recaptured 6/85

(continued on next page)

Table 1. (continued)

Tattoo	Capture Sex	Age	Wt.	Date	Serial #	Ear Tags	Comments
299#5	F	17.5	308	5/15/84	same	same	w/3@1, 417-419
417#2	M	1.5	94	5/15/84	12080	same	w/G299 & siblings, small implant
418#2	M	1.5	86	5/15/84	12081	same	w/G299 & siblings, large implant
419#2	M	1.5	84	5/15/84	12076	same	w/G299 & siblings, amall implant
399#2	M	10.5	662	5/15/84	6405	same	alone
388#2	F	15.5	400*	5/16/84	same	same	w/2c
(#16)	M	0.5	--	5/16/84	(1389)	(1389/1390)	w/G388, capture-induced seperation, died/shed 6/84
(#17)	F	0.5	00	5/16/84	(1623)	(40/50)	w/G388, capture induced seperation, died 5/84
312#3	F	14.5	300*	5/16/83	(6332)	same,	w/3c, old and new radio failures, capture mortality on 5/17/84
(279#3)	M	13.5	800*	5/16/84	(6339 18884)	same,	large implant, shot 9/84
281#4	F	7.5	350*	5/17/84	6407	same	w/2c
(21)	M	0.5	14	5/17/84	(1703)	1386/1383	w/G281, drowned?
(22)	M	0.5	14	5/17/84	(1710)	(1385/1384)	w/G281, killed by BrB
337#3	F	16.5	325	5/17/84	same	same	w/2c, recaptured 6/85
08	F	0.5	12	5/17/84	1708	1338/1337	w/337
09	F	0.5	12	5/17/84	1711	1340/1339	w/337
340#3	F	6.5	375*	5/17/84	same	same	w/2c, recaptured 6/85
23	?	0.5	17	5/17/84	1713	45/28	w/340,
24	?	0.5	14	5/17/84	1706	44/27	w/340
420	F	19.5	350*	5/17/84	6335	2447/2057	w/2@1, one is 421
421	M	1.5	78	5/17/84	3984/1886	1644/2086	w/420 & uncaptured sibling. large implant, female sibling, 437, captured 6/85
422	M	4.5	205	5/18/84	18716	2136/2137	alone near camp
381#2	F	5.5	263	5/18/84	6341	same	alone
400#2	M	21.5	600*	5/18/84	6325	same	alone
382#2	M	2.5	148	5/18/84	15289	same	w/G313, old implant = 8.110, breakaway
423	F	A	300*	5/18/84	6306	none	w/4c, drug problem
25	M	0.5	7	5/18/84	1712	39/32	smallest cub w/G423
--	F	0.5	--	5/18/84	--	49/48	other sibling w/G413 not marked or sexed
425	F	A	--	6/01/84			w/282 M
282#3	M	8.5	--	6/01/84			w/425, recapture of shed collar
342#3	M	5.6	--	7/28/84	--	--	capture mortality
427	M	A	195	6/01/85	6322	1697/2113	rot-away canvas spacer used
398#2	F	4.5	200*	6/01/85	6315	same	396's offspring @2 in 1983
314#2	F	7.5	285*	6/01/85	6352	same	w/1@1 2 yr old w/G313 on 5/80; had litter at age 6
429	F	1.5*	104	6/01/85	--	1514/1518	w/G314 break-away marker collar w/black flag
341#2	F	10.5	--	6/03/85	6287	2174/1372	old collar failed permaturely added new tags to old
214#2	M	9.5	600*	6/03/85	xx46	1071/1649	previously shed collar
437	F	2.5*	175*	6/03/85	1036	2082/2083	w/G421, probably sibling, rot-away collar
309/440	M	17.5	700*	6/04/85	6298	2163/1523	old collar shed, tattoo 440 in upper left, break-away
442	M	A	750*	6/04/85	--	1677/2117	"Harley" yellow flag in rt. ear
443	M	A	400*	6/04/85	--	2172/--	red flag in right, blond
397#2	F	4.5	300*	6/04/85	6449	1534/1597	estus w/443, was w/G396 in 1983@2
447	F	A	400*	6/05/85	10337	2430/2429	--, break-away
347#2	M	18.5	650*	6/09/85	--	2184/2181	orange flags in ears, old eartags gone
339/450	M	4.5	150*	6.09/85	--	1221/2130	originally captured in 1981 @0w/G283, sexed as F, switched w/sex of sibling? Tattoos=450
385#2	F	4.5	130*	6/09/85	--	1507/1592	green flag on visual drop-off, old ear tags replaced
407#2	F	6.5	200*	6/09/85	same	same	alone drop-off feature added to collar
337#4	F	17.5	200*	6/09/85	6440	same	w/2@1 - these have no collars
273	F	9.5	200*	6/09/85	6342	same	age=3 in 1979, transported, returned, old collar replaced
340	F	17.5	250*	6/10/85	6333	same	replaced collar, w/2@1
280#4	M	10.5	400*	6/10/85		same	collar removed

* Weight estimated, ( ) indicates shed collar or dead bear, # recapture, - collar or mark replaced subsequently,

Table 2. Predicted and observed spring 1984 reproductive status of radio-collared female brown bears.

ID	1984 age	Predicted* 1984 status	Comments	Observed 1984 status
281	7	cubs	lost '83 litter(2) in May	2 cubs
283	16	cubs	lost '83 litter(1) in May, bred	alone
394	7	cubs	lost '83 litter(1) in May, bred	alone
312	14	cubs	weaned 1@2 in '83, bred	3 cubs
337	16	cubs	weaned 1@2 in '83, bred	2 cubs
384	13	cubs	weaned 3@2 in '83, bred	2 cubs
388	15	cubs	weaned 2@2 in '83, bred	2 cubs
396	14	cubs	weaned 2@2 in '83, bred	1 cub
315	6	cubs	first litter?	alone
335	6	cubs	first litter	2 cubs
340	6	cubs	first litter, bred in '83	2 cubs
381	5	cubs	first litter	alone
407**	5	cubs	alone in '83, first litter?	alone
299	17	3 ylgs	had cubs in '83	3 ylgs
344	8	1 ylg	had cubs in '83	1 ylg
403**	7	1 ylg	had cubs in '83	1 ylg
313	13	w/1@2	with 1@1 in '83	w/1@2
379**	7	w/1@2	with ylgs in '83	2/1@2
385	3	barren	weaned from G337 in '83	barren
393(missing?)	3	barren	weaned from G384 in '83	NA

* See Table 6 in Miller (1984:78)

** bear occurs in the downstream study area

Table 3. Predicted spring 1985 reproductive status of radio-collared female brown bears.

ID	1985 age	Predicted* 1985 status	Comments	Observed 1985 status
281	8	cubs	lost '83 & '84 litters in May, bred in '84	2 cubs
283	17	cubs	litter was expected in '84, bred	2 cubs
388	16	cubs	lost '84 litter in May, bred	2 cubs
396	15	cubs	lost litter(1) in May	2 cubs
315	7	cubs	first litter was expected in '84	NA (missing)
381	6	cubs	first litter was expected in '84, bred	2 cubs
407**	6	cubs	first litter was expected in '84	alone
379**	8	cubs	weaned 1@2 in '84	alone
313	14	cubs	weaned 1@2 in '84, bred	NA (missing)
344	9	cubs?	lost 1@1 in May, bred	NA (missing)
425	A	cubs	bred in '84	2 cubs
337	16	w/2@1	2 cubs in '84	2 ylgs
384 (missing)	14	w/2@1	2 cubs in '84	NA
335	7	w/2@1	2 cubs in '84	2 ylgs
340	7	w/2@1	2 cubs in '84	2 ylgs
423	A	w/3@1	3 cubs in '84	3 ylgs
299	18	w/3@2	3@1 in '84	NA (missing)
403	8	w/1@2	1@1 in '84	alone?
420	A	w/2@2	w/ylgs in '84	w/2@2
385	4	barren	barren in '84	alone

* January, 1985

Table 4. Summary of Nelchina Basin brown bear litter size data for cubs of the year (based on spring observations of radio-collared bears).

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS	Usable Summary
207(1978, 11)	3(1978)	When last seen on 10/7/78 had all 3 cubs on 5/31/79 had only one yearling which stayed with her until last observation on 9/12/79	2 of 3 lost
213(1978, 10)	2(1979)	lost apparent yearling due to 1978 capture, had newborns when transplanted in 1979, lost these 8-16 days after release, bear apparently died in study area after return	none-transplant bias
231(1979, 13)	3(1979)	Turgid in 1978, bred, lost 2 of 3 cubs by 11 June 1979, survivor lived at least until last observation on 3 August 1979 (no exit data in 1980)	2 of 3 lost
206(1978, 13)	3(1979)	lactating female with male in 1978, during last observation prior to shedding collar the cubs were not seen but undergrowth was thick (6/17/79)	none
313(1981, 10)	1(1981)	bear had a 2-y offspring in 1980, lost cub (possible capture-related)	1 of 1 lost (capture related?)
313(1982, 11)	2(1982)	both survived	0 of 2 lost
312(1981, 11)	2(1981)	had a 2-year old in 1980, lost 1 cub by 6/18, other weaned in 1983	1 of 2 lost
312(1984, 14)	3(1984)	capture-related losses (collared)	none
283(1981, 13)	2(1981)	weaned 2 at 2 in 1980, lost 1 cub by 9/1 other lost as yearling	1 of 2 lost

Table 4. (cont'd)

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS	Summary
283(1983, 15)	1(1983)	killed by brown bear by 5/17/83, cub was collared	1 of 1 lost
337(1981, 13)	3(1981)	cubs and female reunited, 1 cub lost in 81/82 den, other 2 survived to exit (1 weaned in 1983, other lost as ylg.)	1 of 3 lost
337(1984,16)	2(1984)	both survived to den, collared cubs	0 of 2 lost
344(1981, 5)	2(1981)	both lost in '82 as yearlings	0 of 2 lost
344(1983, 7)	2(1983)	lost 1 in early July - other survived to den exit	1 of 2 lost
379(1982, 5)	2(1982)	both survived	0 of 2 lost
341(1981, 6)	2(1982)	survived until 7/15/82 when bear was lost	none
299(1980, 13)	1(1982)	bear weaned 2 @ 2 in 1981, cub lost by 6/9/82	1 of 1 lost
299(1983, 16)	3(1983)	all cubs collared, alive to den exit	0 of 3 lost
281(1983, 6)	2(1983)	both killed by brown bear by 6/1/83, cubs collared	2 of 2 lost
281(1984, 7)	2(1984)	lost both in May, one suspected killed by brown bear, other unknown (accidental drowning?), collared cubs	2 of 2 lost
394(1983, 6)	1(1983)	lost (capture related?) by 5/16, bred	1 of 1 lost (capture related?)

Table 4. (cont'd)

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS	Summary
403(1983, 6)	2(1983)	lost 1 in Sept., other ok to exit	1 of 2 lost
384(1984, 13)	2(1984)	survived to Sept. at least	0 of 2 lost
396(1984, 14)	1(1984)	lost in May	1 of 1 lost
335(1984, 6)	2(1984)	both survived to den	0 of 2 lost
340(1984, 6)	2(1984)	both survived to den, collared cubs	0 of 2 lost
388(1984, 15)	2(1984)	capture-related losses (collared)	none
423(1984, A)	4(1984)	one died in July (collared), others ok to den	1 of 4 lost

Summary

No. of cubs	No. of litters	mean litter size (range)	19 of 47 cubs lost in first year of life = 40% (2 of these possibly capture-related)
59	28	2.1 (1-4)	

Table 5. Summary of Nelchina Basin brown bear litter size data for litters of yearlings (based on spring observation of radio-collared bears).

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS	Summary
220(1978, 5)	1(1978)	ylg entered den and was weaned in 1979, bred	0 of 1 lost
221(1978, 8)	2(1978)	survived, weaned in 1979	0 of 2 lost
234(1978, 5)	2(1978)	Paxson dump bear, lost apparent ylgs between 6/23/78 and 8/4/78, reportedly had cubs in August 1979, radio failed	none
240(1979, 5)	2(1979)	bear transplanted with ylgs, not known if ylgs, survived to return to expt. area, bear was alone on 7/18/80	none
244(1979, 6)	1(1979)	thin female transplanted with ylg, ylg. survived at least 21 days, female bred, but alone in July and August 1980	none-transplant bias
251(1979, 10)	2(1979)	very large yearlings lost 10-17 days after transplant, bear had no cubs in 1980 (August)	none, transplant bias
254(1979, 9)	2(1979)	female died after transplant (ylgs??)	none
261(1979, 7)	2(1979)	lost 1 ylg between 1 and 7 days after transplant, other survived at least until Sept., didn't return to study area	none-transplant bias
269(1979, 16)	2(1979)	transplanted, returned to study area with female, no cubs on 9/29/80, shot in fall 1981 reportedly without cubs	none, transplant bias
274(1979, 11)	1(1979)	transplanted, no radio	none
207(1978, 11)	1(1979)	survived until 9/12/79	0 of 1 lost
231(1978,12)	1(1979)	survived until 8/79	none
213(1978, 10)	1(1978)	apparent ylg was not captured, had cubs following year	1 of 1 lost (capture related?)

(continued on next page)

Table 5. (cont'd)

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS	Summary
277(1980, 10)	2(1980)	ylgs. visually aged, not captured, survived to enter den, no exit data as bear shed collar in den	0 of 2 lost
299(1980, 13)	2(1980)	both survived, weaned next year	0 of 2 lost
299(1984, 17)	3(1984)	all survived with internals to den	0 of 3 lost
312(1982, 12)	1(1982)	survived, weaned next year	0 of 1 lost
283(1982, 14)	1(1982)	lost by 5/18/82	1 of 1 lost
337(1982, 14)	2(1982)	lost 1 by 6/17/82, other survived	1 of 2 lost
380(1982, 15)	2(1982)	both survived to den entrance, at least 1 exited den and was weaned	0 of 2 lost
344(1982, 6)	2(1982)	lost 1 by 6/17, other by 7/26/82	2 of 2 lost
344(1984, 8)	1(1984)	lost 1 in May, sibling lost year before	1 of 1 lost
313(1983, 12)	2(1983)	lost 1 (surgery related?) by 6/2/83, other survived thru Oct.	0 of 1 lost
379(1983, 6)	2(1983)	lost 1 in June-Sept. period	1 of 2 lost

Summary

No. of yearlings	No. litters	mean litter size (range)	
40	24	1.7 (1-3)	7 of 24 lost = 29%

Table 6. Summary of Nelchina Basin brown bear litter size data for litters of 2-year olds (based on observation of radio-collared bears).

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS
204(1978, 7)	2(1978)	weaned by 6/19/78, bred
283(1980, 12)	2(1980)	weaned in mid-June, bred, new litter next year
312(1980, 10)	1(1980)	weaned right after capture in May, new litter in 1981
312(1983, 13)	1(1983)	weaned by 6/13, bred
313(1980, 9)	1(1980)	weaned by May, bred, new litter in 1981
313(1984, 13)	1(1984)	weaned in May, bred
220(1978, 5)	1(1979)	weaned by 6/17, bred
221(1978, 8)	2(1979)	--
269(1979, 16)	2?(1980)	--
299(1980, 13)	2(1981)	weaned in 5/81, new litter in 1982
337(1983, 15)	1(1983)	weaned by 5/15, bred
384, 1983, 12)	3(1983)	weaned by 6/13, one of these 3 may not have been part of this litter, bred
388(1983, 14)	2(1983)	weaned by 6/13, bred
396(1983, 13)	2(1983)	weaned by 6/1, bred

(continued on next page)

Table 6. (cont'd)

BEAR ID(year-age)	LITTER SIZE (year)	COMMENTS
331(1981, 6)	2(1981)	weaned by 6/15, bred, no cubs in 1982, died in 1982 (reason?)
379(1984, 1)	1(1984)	apparently weaned cub (time?), bred

Summary

No. of 2-year olds	No. of litters	Mean litter size(range)
26	16	1.6(1-3)

Table 7. Brown bear offspring survivorship and weaning, GMU 13 studies. (Excludes bears transplanted in 1979).

	MOTHER'S ID (age in year when first captured)				
year	G207(11 in 1978)	G220(5 in 1978)	G221(8 in 1978)	G204(7 in 1978)	G321(12 in 1978)
1978	3 cubs, April-Oct.	1 ylg., May-Oct.	2 ylgs., May-Oct.	2 @ 2 in May, weaned in June and bred	bred
1979	1 ylg., May-Sept. 2 ylgs., lost in 78/79 den?)	1 @ 2, weaned in June	2 @ 2 weaned in May, radio failure	no data	2 of 3 cubs lost in June, 1 survived April-Sept.
1980	no data	no data	no data	no data	no data

	MOTHER'S ID (age in year when first captured)					
year	G277(10 in 1980)	G312(10 in 1980)	G299(13 in 1980)	G313(9 in 1980)	G283(13 in 1980)	G281(3 in 1980)
1980	2 @ 1 survived April thru August, collar shed in den	weaned 1 @ 2 in May breeding not observed	2 of 2 ylgs. survived May-Oct.	weaned 1 @ 2 in May, bred	weaned 2 @ 2 in June, bred	not estrus
1981	no data	1 of 2 cubs lost in June, other survived May-Oct.	weaned 2 @ 2 in May and bred	1 @ 0 lost in May (?capture related?)	1 of 2 cubs lost in Aug., other survived	estrus, bred
1982	no data	yearling survived	lost 1 of 1 @ 0 in June	2 @ 0 survived	lost 1 @ 1 in May, bred	alone, bred
1983	no data	weaned 1 @ 2 in June, bred, offspring=G385, transmitted	3 @ 0 survived (w/collars)	1 @ 1 lost in June (transmitted internally), sibling survived	lost 1 @ 0 in May, bred. lost cub had transmitter	2 @ 0 lost in May, bear predation, not seen breeding
1984 (to Oct.)	no data	w/2 @ 0-bear killed in May	3 @ 1 survived (w/internals)	1 @ 2 weaned in May, bred	alone, bred	2 @ 0 lost in May, bred

(table continued on next page)

Table 7. (continuation page 1)

	MOTHER'S ID (age in year when first captured)						
year	G331(6 in 1981)	G334(10 in 1981)	G341(6 in 1981)	G337(13 in 1981)	G344(5 in 1981)	G335(2 in 1981)	G340(3 in 1981)
1981	2 @ 2 weaned in May, bred	weaned 1 @ 2 in May, bred, bear missing since Sept.	alone, bred in May	lost 1 @ 0 in winter den, 2 survived	2 @ 0 survived	weaned from mother	alone
1982	no cubs, bred, died in July (reason?)	no data	had 2 @ 0 thru July, bear missing subsequently	lost 1 @ 1 in June other survived	lost 1 @ 1 in May, lost other in early July	alone, bred	alone
1983	--	no data	no data	weaned 1 @ 2 in May, bred	2 @ 0, lost 1 by late June, other survived	alone, bred	alone, bred
1984 (to Oct)	--	no data	no data	w/2 @ 0, collared, both survived	1 @ 1 lost in May, bred	w/2 @ 0 thru Oct.	w/2 @ 0, survived to Oct.

	MOTHER'S ID (age in year when first captured)					
year	G380(5 in 1982)	G394(6 in 1983)	G384(12 in 1983)	G379(5 in 1982)	G388(14 in 1983)	G381(3 in 1982)
1982	2 @ 1 survived until denning, one may have died in den	no data	no data	2 @ 0 survived	no data	alone
1983	at least 1 @ 2 weaned in May, possibly both. shot in Sept.	lost 1 @ 0 in May (?capture related possible?), bred	weaned 2 or 3 @ 2 in June, bred	1 of 2 survived, lost 2 (June-Sept.)	weaned 2 @ 2, bred	alone
1984 (to Oct.)	--	alone, shot --	w/2 @ 0 thru Sept., missing	Probably weaned 1 @ 2 after May 23	w/2 @ 0 - capture-related cub loss, bred	alone, bred

	MOTHER'S ID (age in year when first captured)							
year	G396(13 in 1983	G403(6 in 1983)	G315(5 in 1983)	G385(2 in 1983)	G407(4 in 1983)	G420(A in 1984)	G423(A in 1984)	G425(A in 1984)
1983	weaned 2 @ 2 in May, bred	2 @ 0 thru Aug. lost 1 in Sept.	alone, bred	weaned from mother	alone	no data	no data	no data
1984 to Oct.	lost litter of 1 @ 0 in May, breeding?	w/1 @1 in April, bear not seen subsequently	alone, breeding not seen	alone	alone	w/2 @ 1 thru Oct.	4 @ 0, one lost in July, others survived to Oct.	alone, bred

Table 8. Summary of known losses from brown bear litters of cubs and yearlings. Losses dated from emergence in year indicated to emergence the following year.

Year of emergence	losses of cubs	losses of yearlings
1978	2 of 3 lost (G207)	0 of 3 lost (G221, G220)
1979	2 of 3 lost (231#)	0 of 1 lost (G207##)
1980	no data	0 of 4 lost (G299, G277*)
1981	4** of 10 lost (G312, G313, G283, G337, G344)	no data
1982	1*** of 5 lost (G299, G313, G379)	4 of 8 lost (G312, G283, G337, G344, G380****)
1983	6' of 11 lost (G283, G344, G299, G281, G394, G403)	2 of 4 lost (G379, G313")
1984 (thru Oct.)	4 of 15 lost (281, 337, 335, 340, 384###, 396, 423)	1 of 6 lost (299, 344, and 420; 403 not included because of no visuals after April)
TOTALS:	19 of 47 lost = 40%	7 of 26 lost = 27%
Excluding possible capture-related deaths and incomplete data:	15 of 38 lost = 39%	6 of 21 lost = 29%

\# last observation on 8/3/79

last observation on 9/12/79

last observation on 9/6/84

* G277 shed collar in den so family status in spring 1981 was not determined, assumed 2 offspring were alive at emergence in 1981.

** One lost cub may have been capture-related (from litter of 1 with G313).

*** From litter of one with G299 (bears not handled).

**** G380 had 2 yearlings thru den entrance in 1982, only one was verified with her in spring 1983 but both were counted as surviving.

' One lost cub may have been capture-related (from litter of 1 with G394).

'' One of G313's yearlings died within 1 month of surgery to install internal transmitter (other survived), assumed this death was not surgery-related.

Table 9. Morphometrics of brown bear cubs-of-the-year handled in GMU 13, 1978-1984

CUB ID	MOTHER'S ID	DATE HANDLED	SEX	WT(lbs)	COMMENTS
001	G213	22 May 1979	M	10.0	transplanted, see Ballard
002	G213	22 May 1979	M	10.0	et al. (1980)
--	G207	27 May 1978	M	12.0	see Spraker, et al. (1981)
--	G207	27 May 1978	F	12.0	
G338	G283	6 May 1981	M	12.0	ear tagged
G339	G283	6 May 1981	F	13.0	ear tagged
G336	G313	6 May 1981	F	--	cub abandoned?, ear tagged
003	G283	14 May 1983	F	--	collared
004	G394	15 May 1983	F	10.0	neck=230mm, ear tagged
005	G281	15 May 1983	M	8.5	collared
006	G281	15 May 1983	F	8.3	collared
418	G299	18 May 1983 (den)	M	over 10.0	neck=225mm, collared
419	G299	18 May 1983 (den)	M	over 10.0	neck=245mm, collared
417	G299	18 May 1983 (den)	M	over 10.0	neck=225mm, collared
016	G388	16 May 1984	M	13.5	collared, 13.5 lbs (5/29/84)
017	G388	16 May 1984	F	-	collared
021	G281	17 May 1984	M	14.0	collared, neck = 250mm
022	G281	17 May 1984	M	13.5	collared
008	G337	17 May 1984	F	12.3	collared, neck = 220
009	G337	17 May 1984	F	11.5	collared, neck = 230
023	G340	17 May 1984	?	16.5	collared
024	G340	17 May 1984	?	14.0	collared
025	G423	18 May 1984	M	7.0	collared, smallest of 4 in litter
---	G423	18 May 1984	F	-	not collared
018	G312	16 May 1984	F	17.0	collared
019	G312	16 May 1984	M	16.0	collared
020	G312	16 May 1984	M	17.0	collared

Totals: 14 males and 11 females

Table 10. Morphometrics of brown bear yearlings handled in GMU 13, 1978-1984

YLG ID	MOTHER'S ID	DATE HANDLED	SEX	WT(lbs)	COMMENTS
G232	G234	23 June 1978	F	100(est.)	Spraker, et al. (1981)
G235	G234	23 June 1978	F	100(est.)	
G238	G240	23 May 1979	M	95	transplanted, see
G239	G240	23 May 1979	F	65	Ballard et al. 1980
G245	G244	24 May 1979	F	46	transplanted, op cit.
G252	G251	27 May 1979	M	134	transplanted, op cit.
G253	G251	27 May 1979	M	139	
G256	G254	27 May 1979	M	47	transplanted, op cit.
G257	G254	27 May 1979	M	47	
G262	G261	2 June 1979	M	90	transplanted, op cit.
G263	G261	2 June 1979	M	87	
G270	G269	6 June 1979	F	100	transplanted, op cit.
G271	G269	6 June 1979	F	95	
G275	G274	7 June 1979	M	68	transplanted, op cit.
G297	G399	4 May 1980	M	65	tagged
G298	G399	4 May 1980	M	65	tagged
G382	G313	14 May 1983	M	66	implant transmitter
G383	G313	14 May 1983	F	53	implant transmitter
G417	G299	15 May 1984	M	94	implant transmitter (small)
G418	G299	15 May 1984	M	86	implant transmitter (large)
G419	G299	15 May 1984	M	84	implant transmitter (small)
G421	G420	17 May 1984	M	78	sibling not captured, large implant and breakaway.

Totals: 15 males and 7 females

Table 11. Number of Susitna river crossings by radio-marked brown bears, 1980-1984.

Bear ID	Yr. Initial capture (age)	No. of River Crossings 1980	1981	1982	1983	1984	Comments
Males							
389	1983(2)	-	-	-	1	-	388's cub, died fall '83
390	1983(2)	-	-	-	0	0	388's cub, missing 5/84
391	1983(2)	-	-	-	1	-	384's cub
392	1983(2)	-	-	-	0	-	384's cub
393	1983(2)	-	-	-	4	-	384's cub, missing **
293	1980(3)	2	0	1	2	-	Wide-ranging
214	1980(4)	0	-	-	-	-	shed collar in '80
399	1983(4)	-	-	-	4	2	active
280	1980(5)	2	10	3	8	5	active, missing 10/84
308A	1980(6)	0	-	-	-	-	Missing in '80, shot in '83
282	1982(6)	-	-	6	4	6	active
279	1980(9)	0	-	-	3	4	shot (hunter) 9/84
373	1982(9)	-	-	3	0	-	shed collar
294	1980(10)	1	0	-	-	-	recapture mortality
295	1980(12)	1	-	-	-	-	shed collar in '80
309	1980(12)	0	0	-	-	-	shed collar in '81
347	1981(14)	-	0	-	-	-	shed collar in '81
400	1983(20)	-	-	-	1	6	active
342A@	1981(2)	-	1	0	2	0	capture mortality 7/84
382	1983(1)	-	-	-	-	6	active
422	1984(A)	-	-	-	-	10	active
Total males		6	11	13	30	39	

(continued)

Table 11. (continued)

Bear ID	Yr. Initial capture (age)	No. of River Crossings 1980	1981	1982	1983	1984	Comments
Females							
315	1980(2)	-	-	-	4	2	radio-collared in 1983, active
385	1983(2)	-	-	-	0	0	337's cub, missing 10/84
386	1983(2)	-	-	-	0	-	shot (hunter) 5/84
281	1980(3)	1	6	5	6_{*2}	6_{*2}	cubs killed by other bears (83 & 84)
335	1981(3)	-	0	0	0	0_{*2}	334's cub, active
340	1981(3)	0	6	8	4	2_{*2}	active
381	1982(3)	-	-	4	1	8	active
395	1983(3)	-	-	-	1	-	shot (hunter) '83
308B	1980(5)	5	7	-	-	-	recapture mortality
344	1981(5)	-	0_{*2}	0_{y2}	0_{*2}	0_{y1}	active, missing 9/84
331	1981(6)	-	4_{+2}	3	-	-	died July 1982
341	1981(6)	-	9	0_{*2}	-	-	missing 1982 **
394	1983(6)	-	-	-	10	3	lost cub as capture mortality?, shot (hunter) 9/84
313	1980(9)	0	0	0_{*2}	2_{y1}	0	active, missing 10/84
277	1980(10)	0_{y2}	-	-	-	-	collar shed in 1980
312	1980(10)	0	0_{*2}	0_{y1}	0_{+1}	-	capture mortality
334	1981(10)	-	0_{+1}	-	-	-	missing 1982 **
283	1980(12)	0_{+2}	0_{*2}	4	2	2	1983 cub killed by another bear
384	1983(12)	-	-	-	0_{*2-3}	0_{*2}	active, missing 9/84
299	1980(13)	2_{y2}	2	2	0_{*3}	6_{y3}	active
337	1981(13)	-	0_{*3}	0_{y2}	0	0_{*2}	active
396	1983(13)	-	-	-	0_{*1}	0	

(continued)

Table 11. (continued)

Bear ID	Yr. Initial capture (age)	No. of River Crossings 1980	1981	1982	1983	1984		Comments
388	1983(14)	-	-	-	0_{+2}	0_{*2}		active
380	1982(15)	-	-	0_{y2}	0	-		shot
407 @	1983(4)	-	-	-	0	0		active
379 @	1982(5)	-	-	1_{*2}	5_{y1}	4_{+1}		active
403 @	1983(6)	-	-	-	1_{*2}	6_{y1}		active
420	1984(19)	-	-	-		6_{y2}		active
423	1984(A)	-	-	-		2_{*4}		active
425	1984(A)					0		active
Total females		8	34	27	36	47		
Total both sexes			14	45	40	66	86	

@ = Downstream bears

Reprod. status as of 31 May: * = cub

y = yrlg

+ = 2 yr old

** possible unreported hunter kill, collar failure, or emigration.

Table 12. Number of observations of radio-marked brown bears (older than 2.0 years) within nestled proximity zones of the Watana impoundment (den-related activies are not included).

TIME PERIOD	ZONE 1 (impoundment)	ZONE 2 (shore-1 mile)	ZONE 3 (1-5 miles)	ZONE 4 (over 5 miles)	TOTAL
1. April 1-30	6	1	8	9	24
2. May 1-15	12	8	19	69	108
3. May 16-31	31	27	65	108	231
4. June 1-15	70	67	154	89	380
5. June 16-30	45	35	104	69	253
6. July 1-15	6	8	39	37	90
7. July 16-31	4	14	61	42	121
8. August 1-15	4	11	41	44	100
9. August 16-March 31	26	22	97	168	313
TOTALS	204	193	588	635	1620
Area within zone (km^2)	159.32	327.07	1233.51	--	1719.00
%	9.26	19.02	71.72	--	100.0

Value of Chi Square test of the null hypothesis that use of each zone is equivalent to expected values based on the area of each zone for:

Period	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
All months	204	91.2	193	187.4	588	706.4	160**	2
April 1-June 30	164	60.4	138	124.0	350	467.6	209**	2
July 1-March 31	40	30.8	55	63.3	238	238.8	3.9	2

* reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 13. Number of observations of radio-marked male brown bears (older than 2.0 years) within nestled proximity zones of the Watana impoundment (den-related activies are not included).

TIME PERIOD	ZONE 1 (impoundment)	ZONE 2 (shore-1 mile)	ZONE 3 (1-5 miles)	ZONE 4 (over 5 miles)	TOTAL
1. April 1-30	4	0	3	3	10
2. May 1-15	6	3	7	15	31
3. May 16-31	9	13	23	24	69
4. June 1-15	15	27	55	30	127
5. June 16030	16	12	25	21	74
6. July 1-15	2	3	9	10	24
7. July 16-31	3	3	16	10	32
8. August 1-15	1	2	8	11	22
9. August 16-March 31	8	6	20	60	94
TOTALS	64	69	166	184	483
Area within zone (km^2)	159.32	327.07	1233.51	—	1719.00
%	9.26	19.02	71.72	—	100.0

Value of Chi Square test of the null hypothesis that use of each zone is equivalent to expected values based on the area of each zone for:

Period	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
All months	64	27.7	69	56.9	166	214.4	61.1**	2
April 1-June 30	50	20.2	55	41.5	113	156.4	60.4**	2
July 1-March 31	14	7.5	14	15.4	53	58.1	6.2**	2

* reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 14. Number of observations of radio-marked female brown bears (older than 2.0 years) within nestled proximity zones of the Watana impoundment (den-related activies are not included).

TIME PERIOD	ZONE 1 (impoundment)	ZONE 2 (shore-1 mile)	ZONE 3 (1-5 miles)	ZONE 4 (over 5 miles)	TOTAL
1. April 1-30	2	1	5	6	14
2. May 1-15	6	5	13	42	66
3. May 16-31	22	14	26	67	129
4. June 1-15	53	27	81	47	208
5. June 16-30	24	24	62	36	146
6. July 1-15	4	4	23	20	51
7. July 16-31	1	9	37	22	69
8. August 1-15	3	7	25	26	61
9. August 16-March 31	21	14	55	86	176
TOTALS	136	105	327	352	920
Area within zone (km^2)	159.32	327.07	1233.51	--	1719.00
%	9.26	19.02	71.72	--	100.0

Value of Chi Square test of the null hypothesis that use of each zone is equivalent to expected values based on the area of each zone for:

Period	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
All months	136	52.6	105	108.0	327	407.4	148**	2
April 1-June 30	107	33.8	71	69.4	187	261.8	180**	2
July 1-March 31	29	18.8	34	38.6	140	145.6	6.3**	2

* reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 15. Number of observations of radio-marked female brown bears with coy (on 15 June) within nestled proximity zones of the Watana impoundment (den-related activies are not included).

TIME PERIOD	ZONE 1 (impoundment)	ZONE 2 (shore-1 mile)	ZONE 3 (1-5 miles)	ZONE 4 (over 5 miles)	TOTAL
1. April 1-30	0	0	0	1	1
2. May 1-15	0	0	1	12	13
3. May 16-31	0	0	16	17	33
4. June 1-15	2	13	18	13	46
5. June 16-30	5	9	17	12	43
6. July 1-15	0	1	7	7	15
7. July 16-31	0	2	8	11	21
8. August 1-15	0	2	8	7	17
9. August 16-March 31	1	2	22	26	51
TOTALS	8	29	97	106	240
Area within zone (km^2)	159.32	327.07	1233.51	--	1719.00
%	9.26	19.02	71.72	--	100.0

Value of Chi Square test of the null hypothesis that the use of each zone is equivalent to expected values based on the area of each zone for:

Period	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
All months	8	12.5	29	25.5	97	96.0	2.1	2
April 1-June 30	7	7.5	22	15.4	52	58.1	3.5	2
July 1-March 31	1	4.9	7	10.1	45	38.0	3.0	2

* reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 16. Chi square test of null hypothesis that the proportion of observations in impoundment proximity zones is the same, for a group of radio-marked female brown bears, during years when they have cubs-of-the-year ("coy") as during years when they do not. (Includes both impoundments, lumps years 1980-1984, cub status is of 15 June, and observation associated with den-related activities are not included).

	Females without coy		Females with coy	
	No. of observations	%	No. of observations	Expected number of observations*
Proximity Zone 1 (inundation area)	59	18.7	8	30.1
Proximity Zone 2 (impoundment shoreline - 1 mile)	58	18.4	32	29.4
Proximity Aone 3 (1-5 miles from impoundment shoreline)	198	62.9	120	100.6
Totals:	315	100%	160	160.1

Chi Square, 2 d.f =20.2*
* significant, P less than 0.01

BEARS INCLUDED:

Bear ID	years without coy	years with coy
283	80, 82, 83, 84	81
299	80, 81, 82, 84	83
312	80, 82, 83	81, 84
313	80, 81, 83, 84	82
335	81, 82, 83	84
337	82, 83	81, 84
340	81, 82, 83	84
341	81	82
344	82	81, 83
384	83	84

Table 17. Number of observed and expected observations of radio-marked brown bears (excluding females with coy and bears less than 2.0 years old) within nestled impoundment proximity zones of the Devils Canyon impoundment (den-related activities are not included).

TIME PERIOD	ZONE 1 (impoundment)	ZONE 2 (shore-1 mile)	ZONE 3 (1-5 miles)	ZONE 4 (over 5 miles)	TOTAL
All males	4	17	38	107	166
All females	10	76	165	174	425
All females without cubs-of-year	10	76	161	158	405
TOTALS					
Area within zone (km^2)	28.92	164.78	689.01	--	882.71
%	3.28	18.67	78.06	--	100.0

Value of Chi Square test of the null hypothesis that the use of each zone is equivalent to expected values based on the area of each zone for:

Sex group	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
Males and females w/o cubs (whole year)	14	10.0	93	57.1	199	238.9	30.8**	2
Males (whole year)	4	1.9	17	11.0	38	46.1	3.0	2
Females w/o cubs	10	8.1	76	46.1	161	192.8	25.1**	2

* reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 18. Characteristics of brown bear dens in the Susitna study area during winters of 1980/81, 1981/1982, 1982/1983, and 1983/1984

	Den No.	Bear ID No.	Age at Exit	Elevation (Feet)	Slope (Degrees)	Aspect (True N.)	Vegetation	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm.)	Previously Used? (Yes/No)	Comments
DUG DENS															
FEMALES															
With offspring (@ exit)															
w/2 @0	14	G283(sp.)	13	3900	28	192	Tussock grass	-	83	-	138	-	196	No	Spring den/collapsed
w/2 @0	16	G283(wt.)	13	3725	26	210	Willows	76	64	239	203	92	291	No	Winter den
w/1 @0	22	G313	10	5150	35	166	Tussock/rock slide	-	-	-	104	-	410	No	Collapsed
w/3 @0	24	G337	13	4825	31	252	Tussock/lg. rocks	57	69	-	152	90	219	No	
w/2 @0	30	G344	5	4760	-	153	--	-	-	-	-	-	-	-	Collapsed/not visited
w/2 @0	31	G312	11	4900	-	145	Tundra/rock	-	-	-	-	-	-	-	Collapsed/not visited
w/2 @1*	25	G277	11	4925	45	93	Moss/rock slide	-	-	-	165	-	207	No	Collapsed
w/2 @2	28	G299	14	4660	25	138	Tundra/rock	-	-	-	-	-	-	No	Collapsed
w/2 @0	42	G331	7	3950	30	213	Willow, Grass	67	52	117	127	84**	290	No	Collapsed
w/2 @0	44	G313	11	4575	34	182	Grass	102**	-	-	-	-	230	No	Collapsed
w/1 @1	47	G312	12	4925	27	201	--	-	-	-	-	-	-	-	Collapsed
w/2 @1	52	G344	6	4250	26	202	Grass	49	65	-	-	-	-	No	Collapsed
w/2 @0	54	G341	7	4575	45**	118**	--	-	-	-	-	-	-	-	Collapsed/not visited
w/1 @0	59	G299	15	3525	31	156	Willow, Alder	58	69	151	136	101	350	No	
w/2 @1	37***	?	?	2075	36	346	Alder	53**	79	-	-	-	-	No	Partially collapsed
w/3 @0	76	G299	16	4150	17	189	Tundra	64	76	-	-	-	-	No	Spring den, collapsed
w/3 @0	78	G299	16	3975	27	220	Tundra	-	66	-	-	-	-	No	Collapsed
w/2 @1	87***	G379	6	1375	28	218	Alder	-	-	102	221	86	345	No	Collapsed
w/2 @1	89***	G379	6	1050	42	40	Alder, Ferns	-	76**	-	-	-	-	No	Spring den, collapsed
w/2 @1	102	G313	12	4750**	35**	23**	Tundra	-	-	-	-	-	-	-	Collapsed
w/1 @0	103	G283	15	3725	39	176	Tundra, Willows	61	69	103	101	-	177	No	
w/2 @0	104	G281	6	4575	33	198	Tundra	58	56	136	88	-	136	No	Collapsed
w/1 @2	105	G337	15	5150**	45**	336**	Tundra	-	-	-	-	-	-	-	Collapsed
w/1 @2	107	G337	15	4900**	35**	34**	Tundra	-	-	-	-	-	-	-	Spring den, collapsed

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Table 18. (continued)

	Den No.	Bear ID No.	Age at Exit	Elevation (Feet)	Slope (Degrees)	Aspect (True N.)	Vegetation	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm.)	Previously Used? (Yes/No)	Comments
w/1 @2	108	G312	13	4540**	40**	51**	Tundra, Grass	-	-	-	-	-	-	-	Collapsed
w/2 @0	109	G344	7	4750**	50**	101**	Tundra	-	-	-	-	-	-	-	Collapsed
w/2 @0	112	G384	13	4125	11	69	Tundra	72	78	212	135	-	275	No	Partially collared
w/1 @1	117	G344	8	4525	30**	98	Tundra	-	-	-	-	-	-	-	Collapsed
w/2 @0	118	G335	6	3500	30**	303	Alder/shrub	-	-	-	-	-	-	-	Collapsed
w/2 @0	119	G388	15	3700	33	73	Tundra	-	-	-	-	-	-	-	Collapsed
w/2 @0	120	G340	6	4450	30	283	Tundra/rocks	-	-	-	-	-	-	-	Collapsed
w/2 @0	121	G340	6	3275	34	249	Tundra	62	96	96	109	113	163	Yes	Spring den
w/3 @1	124	G299	17	3725	34	274	Grass/willow	-	-	-	-	-	-	-	Collapsed
w/1 @0	125	G396	14	4550	25	238	Tundra/grass/rock	-	-	-	-	-	-	-	Collapsed
w/1 @2	133	G313	13	4150	35	238	Tundra	-	-	-	-	-	-	-	Collapsed
w/2 @0	134	G281	7	4550	20	202	Tundra	-	-	-	-	-	-	-	Collapsed
w/2 @0	135	G337	16	5000	40	193	Tundra/rock	-	-	-	-	-	-	-	Collapsed
w/2 @2	153***	G379	7	2250	26	103	Alder/grass	-	-	-	-	-	-	-	Collapsed
w/o	23	G281	4	4700	39	142	Tussock/rock slide	-	61	-	-	-	-	No	Collapsed
w/o	5	G308b	6	2330	26	358	Alder	69	82	112	112	110	230	No	
w/o	46	G340	4	5150	-	-	--	-	-	-	-	-	-	-	Not visited
w/o	56	G335	3	3525	32	261	Willow, Alder	47	39	-	-	-	224	No	Partially collapsed
w/o	79	G335	4	4350	60**	354**		-	-	-	-	-	-	No	Collapsed
w/o	106	G340	5	4950**	45**	306**	Tundra	-	-	-	-	-	-	-	Collapsed
w/o	111	G381	4	4500**	30**	62**	Tundra	-	-	-	-	-	-	-	Collapsed
w/o	122	G381	5	4300	28	205	Tundra	-	-	-	-	-	-	Yes	Collapsed
w/o	131	G283	16	3450	32	75	Tundra/alder	-	-	-	-	-	-	-	Collapsed
MALES	1	G280	6	3950	32	158	Tundra/grass/rock	48	86	-	231	-	269	No	Collapsed
	15	G284?	3	3990	23	216	Tundra/grass	56	83	135	154	77	239	No	ID uncertain

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Table 18. (continued)

	Den No.	Bear ID No.	Age at Exit	Elevation (Feet)	Slope (Degrees)	Aspect (True N.)	Vegetation	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm.)	Previously Used? (Yes/No)	Comments
	29	G294	11	2650	30	146	Alder/grass	52	80	-	157	89	188	No	Partially collapsed
	36***	G342A	3	2375	31	288	Alder	38	71	81	86	94	124	No	Partially collapsed
	60	G280	7	4125	26	210	Grass, Willow	-	-	-	-	-	-	No	Collapsed
	94***	G342	6	2525	26	299	Alder	66**	74	-	84	81	147	No	Collapsed
	86	G282	7	3200	33	46	Alder, Willow	-	-	-	-	-	-	No	Collapsed
	110	G280	8	3950**	26	54	Grass, Willow	-	-	-	-	-	-	-	Collapsed
	123	G280	9	2950	40	278	Willow/tundra	-	-	-	-	-	-	-	Collapsed
	132	G279	13	3625	40	258	Willow/tundra	-	-	-	-	-	-	-	Collapsed
DUG DENS															
UNKNOWN SEX/ID															
	17	-	-	3925	33	192	Willow	61	62	154	162	122	220	No	
	26	-	-	4090	29	162	Willow/grass	73	65	-	-	-	171	No	Partially collapsed
	27	-	-	4125	26	140	Willow/grass	-	58	-	-	68	-	No	Partially collapsed
	53	-	-	4350	31	195	Grass	-	-	-	-	-	-	No	Collapsed
	77	-	-	4050	29	169	Tundra	-	61	-	-	-	-	No	Collapsed
NATURAL CAVITY															
FEMALES															
w/1 @2	101***	G380	16	3900	31	60	Tundra	54	112	132	143	109	290	-	Slightly excavated
UNKNOWN CAVITY TYPE															
FEMALES															
w/4 @0	149	G423		3500**	--	--	Tundra	-	-	-	-	-	-	-	Not located
w/1 @1	155***	G403	7	2450	--	343	--	-	-	-	-	-	-	-	Not located
w/o	137	G385	3	--	--	--	--	-	-	-	-	-	-	-	Not located
w/o	139	G315	6	--	--	--	--	-	-	-	-	-	-	-	Not located
w/o	148	G394	7	3000**	--	208**	--	-	-	-	-	-	-	-	Not located
w/o	150	G407	6	--	--	--	--	-	-	-	-	-	-	-	Not located
w/1 yrl	41	G283	14	4000	26	161	--	-	-	-	-	-	-	-	Not visited
w/2 @2	48	G337	14	5050	45**	253**	--	-	-	-	-	-	-	-	Not located
	45	G281	5	4575**	25	176	Grass	-	-	-	-	-	-	-	Not located

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Table 18. (continued)

Den No.	Bear ID No.	Age at Exit	Elevation (Feet)	Slope (Degrees)	Aspect (True N.)	Vegetation	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm.)	Previously Used? (Yes/No)	Comments
MALES														
136	G399	10	--	--	--	--	-	-	-	-	-	-	-	Not located
151	G342	7	--	--	--	--	-	-	-	-	-	-	-	Not located

* Entered den with 2 yearlings, shed collar in den so exit not observed.
** Approximate value
*** Downstream

Dens No. 14, 16, 22, 24, 30, 31, 25, 28, 23, 5, 1, 15, 29, 17, 26 27 are 1980/1981

Dens No. 42, 44, 47, 52, 54, 59, 37, 46, 56, 36, 60, 53, 41, 48, 45 are 1981/1982

Dens No. 76, 78, 87, 89, 101, 102, 102, 103, 105, 107, 108, 109, 79, 106, 111, 94, 86, 110, 77 are 1982/1983

Dens No. 112, 117, 118, 119, 120, 121, 124, 125, 133, 134, 135, 153, 122, 131, 123, 132, 149, 155, 137, 139, 148, 150, 136, 151 are 1983/84

Table 19. Brown bear den entrance and emergence dates, winter of 1983/84.

Bear ID	Sex	1983 Entrance			1984 Emergence			Days in Den		
		earliest	latest	Mid.	earliest	latest	Mid.	Min.	Max.	Mid.
G279	M	26 Sep	24 Oct	10 Oct	3 Apr	18 Apr	11 Apr	162	205	184
G280	M	5 Oct	25 Oct	15 Oct	18 Apr	30 Apr	24 Apr	176	208	192
G281	F	26 Sep	24 Oct	10 Oct	30 Apr	10 May	5 May	189	227	208
G282	M	5 Oct	24 Oct	15 Oct	3 Apr	7 Apr	5 Apr	162	215	189
G283	F	26 Sep	5 Oct	1 Oct	18 Apr	10 May	29 Apr	196	227	212
G293	M	27 Sep*	--	--	--	--	--	--	--	--
G299	F	27 Sep*	24 Oct*	11 Oct*	8 Apr	18 Apr	13 Apr	167	204	186
G313	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	204
G315	F	26 Sep	24 Oct	10 Oct	18 Apr	30 Apr	24 Apr	177	217	197
G335	F	15 Sep	26 Sep	6 Oct	30 Apr	10 May	5 May	217	238	228
G337	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	204
G340	F	5 Oct	24 Oct	15 Oct	10 May	17 May	14 May	199	225	212
G342	M	26 Sep*	14 Nov*	21 Oct*	30 Apr	10 May	5 May	168	227	197
G344	F	27 Sep*	14 Nov*	25 Oct*	30 Apr	10 May	5 May	168	226	196
G379	F	24 Oct	14 Nov	25 Oct	3 Apr	18 Apr	11 Apr	141	177	159
G381	F	25 Oct*	--	--	18 Apr	30 Apr	24 Apr	--	188	--
G384	F	5 Oct	25 Oct	15 Oct	10 May	28 May	19 May	198	236	217
G385	F	26 Sep*	24 Oct*	10 Oct*	30 Apr	10 May	5 May	189	227	208
G386	M	5 Oct	24 Oct	15 Oct	--	--	--	--	--	--
G388	F	26 Sep*	15 Nov*	21 Oct*	30 Apr	10 May	5 May	167	227	197
G390	M	5 Oct	24 Oct	15 Oct	30 Apr	3 May	1 May	189	211	200
G391	F	5 Oct	24 Oct	15 Oct	--	--	--	--	--	--
G393	F	27 Sep*	--	--	--	--	--	--	--	--
G394	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	204
G396	F	27 Sep*	25 Oct*	11 Oct*	18 Apr	30 Apr	24 Apr	176	216	196
G399	M	5 Oct	25 Oct	15 Oct	18 Apr	30 Apr	24 Apr	176	208	196
G400	M	27 Sep*	24 Oct	11 Oct*	18 Apr	10 May	24 Apr	177	226	202
G403	F	24 Oct	14 Nov	4 Nov	3 Apr	18 Apr	11 Apr	141	177	159
G407	F	--	--	--	18 Apr	30 Apr	24 Apr	--	--	--
G423	F	--	--	--	16 May	17 May	17 May	--	--	--
	Mean	3 Oct	23 Oct	15 Oct	23 Apr	4 May	29 Apr	178	215	198
	"S"	7.8	10.9	7.1	12.0	11.2	11.4	18.0	16.2	15.7
	n	18	18	18	26	26	26	23	24	23

* Not included in calculation of means

Table 20. Brown bear den entrance and emergence dates, winter of 1984/85.

		1984 Entrance			1985 Emergence			Days in Den		
Bear ID	Sex	earliest	latest	Mid.	earliest	latest	Mid.	Min.	Max.	Mid.
G280	M	11 Oct		(missing)						
G281	F	11 Oct	24 Oct	18 Oct						
G282	M	7 Nov	?	--- (unconfirmed)						
G283	F	11 Oct	24 Oct	18 Oct						
G299	F	1 Oct	11 Oct	6 Oct						
G313	F	1 Oct		(missing)						
G315	F	11 Oct	24 Oct	18 Oct						
G335	F	11 Oct	24 Oct	18 Oct						
G337	F	11 Oct	24 Oct	18 Oct						
G340	F	11 Oct	24 Oct	18 Oct						
G344	F	--		(missing)						
G379	F	1 Oct	11 Oct	6 Oct						
G381	F	11 Oct	24 Oct	18 Oct						
G384	F	--		(missing)						
G385	F	11 Oct		(missing)						
G388	F	11 Oct	24 Oct	18 Oct						
G396	F	21 Sep	11 Oct	1 Oct (shed?)						
G399	M	11 Oct	24 Oct	18 Oct						
G400	M	11 Oct	24 Oct	18 Oct						
G403	F	7 Nov	13 Nov	10 Nov						
G382	M	11 Oct	24 Oct	18 Oct						
G407	F	11 Oct	24 Oct	18 Oct						
G420	F	11 Oct	24 Oct	18 Oct						
G422	M	11 Oct	24 Oct	18 Oct						
G423	F	11 Oct	24 Oct	18 Oct						
G425	F	11 Oct	24 Oct	18 Oct						
	Mean	11 Oct	23 Oct	17 Oct						
	"S"	9.7	6.8	7.6						
	n	24	20	20						

Table 21. Distances between den sites (miles) used in different years by radio-collared brown bears. Based on principle winter den, early spring dens not considered.

Bear ID	Age	80/81 to 81/82	80/81 to 82/83	80/81 to 83/84	81/82 to 82/83	81/82 to 83/84	82/83 to 83/84	80/81 to 84/85	81/82 to 84/85	82/83 to 84/85	83/84 to 84/85	$\bar{x}$	s
FEMALES													
G283	13 in'81	3.2	2.4	1.6	5.3	4.9	1.7	3.4	3.5	5.8	4.4	3.6	1.5
G313	10 in'81	4.1	4.4	3.4	6.7	1.0	5.7	-	-	-	-	4.2	2.0
G337	13 in'81	3.3	2.4	1.9	3.7	3.1	0.6	4.2	1.0	4.7	4.1	2.9	1.4
G344	5 in'81	3.1	1.5	3.8	1.6	1.2	2.5	-	-	-	-	2.3	1.0
G299	14 in'81	8.9	6.7	7.1	3.5	3.5	0.5	11.3	2.7	6.2	6.1	5.7	3.2
G281	4 in'81	1.9	1.7	1.7	0.2	0.2	0.1	2.7	1.5	1.6	1.5	1.3	0.9
G335	4 in'82	-	-	-	2.4	2.0	0.9	-	1.4	1.5	1.9	1.7	0.5
G340	4 in'82	-	-	-	0.3	17.7	17.6	-	18.1	18.0	0.6	12.0	9.0
G312	11 in'81	2.1	0.6	-	1.6	-	-	-	-	-	-	1.4	0.8
G379	6 in'83	-	-	-	-	-	5.3	-	-	5.3	0.5	3.7	2.8
G315	2 in'80							-	-	-	0.8	-	-
G381	3 in'82							-	-	2.8	2.5	2.7	-
G388	14 in'83							-	-	-	0.8	-	-
G396	9 in'83							-	-	-	9.0	-	-
G403	4 in'83							-	-	-	2.2	-	-
G407	4 in'83							-	-	-	5.1	-	-
(FEMALES)	$\bar{x}$ =	3.9	2.8	3.3	2.7	4.2	3.9	5.4	4.7	5.7	3.0	$\bar{x}$(n=77)= 3.8	
	s =	2.3	2.1	2.1	2.3	5.7	5.5	4.0	6.6	5.3	2.6	s = 4.0	
												Range = 0.1-18.1	

(table continued on next page)

Table 21 (cont'd)

Bear ID	Age	80/81 to 81/82	80/81 to 82/83	80/81 to 83/84	81/82 to 82/83	81/82 to 83/84	82/83 to 83/84	80/81 to 84/85	81/82 to 84/85	82/83 to 84/85	83/84 to 84/85	$\bar{x}$	s
MALES													
G280	6 in'81	8.1	6.3	6.0	2.0	2.5	0.5	-	-	-	-	-	-
G342	3 in'82	-	-	-	1.3	7.1	7.4	-	-	-	-	-	-
G282	7 in'83	-	-	-	-	-	4.5	-	-	4.6	1.2	4.6	-
G399	20 in'83	-	-	-						-	1.5	-	-
G400	6 in'83	-	-	-						-	1.2	-	-
(MALES)	$\bar{x}$ =	4.3	3.3	3.6	2.6	4.3	3.9	-	-	4.6	1.3	$\bar{x}$ (n=14)=3.9	
	s =	2.7	2.3	2.2	2.0	5.1	5.1	-	-	-	0.8	s = 2.7	
												Range =0.5-8.1	
Both Sexes	$\bar{x}$ =	4.3	3.3	3.6	2.6	4.3	3.9	5.4	4.7	5.6	2.7	$\bar{x}$ (N=91)=3.8	
	s =	2.7	2.3	2.2	2.0	5.1	5.1	4.0	6.6	5.0	2.4	s = 3.8	
												Range =0.1-18.1	

Table 22. Status of brown bears first marked in 1978. (A=alive, T=transplanted in 1979, NR=no return, R=returned, ND=no data available, F=shot in fall season, Sp=shot in spring season).

Bear#	Sex/age	1978	1979	1980	1981	1982	1983	1984	1985
Upper Susitna Expt. Area									
209	M/5 in '78	A	T,NR	A	Shot-F	-	-	-	-
212	F/10 in '78	A	A	A	A	Shot-F	-	-	-
217	M/3 in '78	A	A	Shot-F	-	-	-	-	-
219	F/4 in '78	A	A	A	A	Shot-F	-	-	-
218	M/4 in '78	A	T,R	Shot-F	-	-	-	-	-
214	M/4 in '78	A	A	A	A	A	A	A	A
230	M/9 in '78	A	T,Shot-Sp	-	-	-	-	-	-
211	M/4 in '78	A	T,NR	ND	ND	ND	ND	ND	ND
216	M/11 in '78	A	T,NR	ND	ND	ND	ND	ND	ND
210/242	M/2 in '78	A	T,ND	ND	ND	ND	ND	ND	ND
215	F/2 in '78	A	T,NR	ND	ND	ND	ND	ND	ND
213	F/10 in '78	A	T*	-	-	-	-	-	-
Not Upper Susitna Expt. Area									
205	M/4 in '78	A	A	A	A	A	Shot-Sp	-	-
206	F/13 in '78	A	A	A	Shot-F	-	-	-	-
201	M/10 in '78	A	A	A	A	A	Shot-Sp	-	-
202	F/8 in '78	Shot-F	-	-	-	-	-	-	-
221	F/8 in '78	A	A	A	A	Shot-Sp	-	-	-
228	M/7 in '78	A	A	A	A	A	Shot-Sp	-	-
227	M/9 in '78	A	A	A	A	A	A	Shot-F	-
224	M/2 in '78	A	A	A	A	A	A	Shot-Sp	-
207	F/11 in '78	A	A	ND	ND	ND	ND	ND	ND
208	F/12 in '78	A	A	ND	ND	ND	ND	ND	ND
220	F/5 in '78	A	A	ND	ND	ND	ND	ND	ND
222	M/11 in '78	A	ND	ND	ND	ND	ND	ND	ND
234	F/5 in '78	A	ND	ND	ND	ND	ND	ND	MD
200	M/7 in '78	A	ND	ND	ND	ND	ND	ND	ND
204	F/7 in '78	A	A	ND	ND	ND	ND	ND	ND
225	M/4 in '78	A	A	ND	ND	ND	ND	ND	ND
231	F/12 in '78	A	A	ND	ND	ND	ND	ND	ND
Max. No. Bears potentially alive in year includes ND (M:F)		29(16:13)	27*(16:11)	26(15:11)	24(13:11)	22(12:10)	19(11:8)	16(8:8)	14(6:8)
No. marked bears known shot in year (M:F)		1(0:1)	1(1:0)	2(2:0)	2(1:1)	3(1:2)	3(3:0)	2(2:0)	ND
% of potentially alive bears known shot in year		3%	4%	8%	8%	14%	16%	13%	ND
Cumulative % (min.) of marked bears shot (N=28)		3%	7%	14%	21%	32%	43%	50%	ND

Not Included:
Subadults @2 in 1978, = 203, 223 (all ND)
Subadults @1 in 1978 = 232 (ND)
* suspected mortality of 213 in 1979, not included as alive in 1979 or subsequently

Table 23. Status of brown bears first captured in 1979 (all were transplanted from upper Susitna drainage). (A-alive, NR=no return, R=returned, ND=no data available, F=shot in fall season, SP=shot in spring season).Does not include transplanted bears first captured in 1978 (see Table 13). ND in year of capture indicated bear was not collared or soon shed its collar and no subsequent data were collected.

Bear ID	Sex/age	1979	1980	1981	1982	1983	1984	1985
246	M/3 in '79	Shot-F	-	-	-	-	-	-
247	M/8 in '79	A	A	A	A	Shot-F	-	-
243	M/2 in /79	A	A	Shot-F	-	-	-	-
265	M/4 in '79	A	Shot-Sp	-	-	-	-	-
268	M/4 in '79	A	Shot-Sp	-	-	-	-	-
269	F/18 in '79	A	A	Shot-F	-	-	-	-
270	F/1 in '79	A	Shot-F	-	-	-	-	-
272	M/9 in '79	A	A	A	Shot-F	-	-	-
260	M/4 in '79	A	A	A	A	Shot-F	-	-
240	F/5 in '79	A,R	A	A	A	A	Shot-Sp	-
241	M/3 in '79	A,ND	ND	ND	ND	ND	ND	
249	M/5 in '79	A,ND	ND	ND	ND	ND	ND	
258	M/21 in '79	A,ND	ND	ND	ND	ND	ND	
264	F/4 in '79	A,ND	ND	ND	ND	ND	ND	
267	F/4 in '79	A,ND	ND	ND	ND	ND	ND	
274	F/11 in '79	A,ND	ND	ND	ND	ND	ND	
276	M/4 in '79	A,ND	ND	ND	ND	ND	ND	
236	F/5 in '79	A,R	ND	ND	ND	ND	ND	
237	M/10 in '79	A,R	ND	ND	ND	ND	ND	
244	F/6 in '79	A,R	A	ND	ND	ND	ND	
251	F/10 in '79	A,R	A	ND	ND	ND	ND	
273	F/3 in '79	A,R	A	A	A	A	A	A
248	F/4 in '79	A,NR	ND	ND	ND	ND	ND	
261	F/7 in '79	A,NR	ND	ND	ND	ND	ND	
Max. No. Bears potentially alive in year includes ND (M:F)		24 (12:12)	23(11:12)	20(9:11)	18(8:10)	17(7:10)	14(4:10)	13(4:9)
No. marked bears known shot in year (M:F)		1(1:0)	3(2:1)	2(1:1)	1(1:0)	2(2:0)	1(0:1)	ND
Known % of potentially alive bears shot in year		4%	13%	10%	6%	12%	7%	ND
Cumulative % (min.) of marked bears shot (N=24)		4%	17%	25%	29%	38%	42%	ND

Not Included:
Subadults @2 in 1979 = 259
Subadults @1 in 1979 = 275, 262 or 263, 256, 257, 252, 253, 245, 271, 239, 238.

Table 24A. Status of Brown Bears first marked during Su-Hydro Studies, 1980-1983. (A=alive, ND=no data available, F=shot in fall season, SP=shot in spring season). ND in year of capture indicates bear was not collared or soon shed its collar and no subsequent data were collected.

Bear ID	Sex/age	1980	1981	1982	1983	1984	1985
1980 captures							
277	F/10 in '80	A	ND	ND	ND	ND	
279	M/9 in '80	A	A	A	A	Shot-F	-
280	M/5 in '80	A	A	A	A	A	A
281	F/3 in '80	A	A	A	A	A	
282	M/4 in '80	A	A	A	A	A	
283	F/12 in '80	A	A	A	A	A	
284	M/2 in '80	A	Shot-F	-	-	-	-
286	M/3 in '80	A	A	A	A	Shot-F	-
292	F/3 in '80	ND	ND	ND	ND	ND	
293	M/3 in '80	A	A	A	A	ND	
294	M/10 in '80	A	Died in Aug.	-	-	-	-
295	M/12 in '80	ND	ND	ND	ND	ND	
299	F/13 in '80	A	A	A	A	A	
297	M/1 in '80	A	Shot-F	-	-	-	-
306	F/3 in '80	ND	ND	ND	ND	ND	
308a	M/6 in '80	A	A	A	Shot-F	-	-
308b	F/5 in '80	A	Died in Aug.	-	-	-	-
309	M/12 in '80	A	A	A	A	A	A
311	M/2 in '80	Shot-F	-	-	-	-	-
312	F/10 in '80	A	A	A	A	Died-NS	-
313	F/9 in '80	A	A	A	A	A	-
314	F/2 in '80	A	A	A	A	A	A
315	F/2 in '80	A	A	A	A	A	-
1981 captures							
331	F/6 in '81	-	A	Died in Aug.	-	-	-
332	M/2 in '81	-	A	Shot-F	-	-	-
333	M/2 in '81	-	Shot-F	-	-	-	-
334	F/10 in '81	-	lost in Sept. -shot?	-	-	-	-
335	F/2 in '81	-	A	A	A	A	A
337	F/13 in '81	-	A	A	A	A	A
339	M/0 in '81	cub	y1g	A	A	A	A
340	F/3 in '81	-	A	A	A	A	A
341	F/6 in '81	-	A	A	A	A	A
342a	M/2 in '81	-	A	A	A	Died-NS	-
344	F/5 in '81	-	A	A	A	Lost in Sept., shot?	
347	M/14 in '81	-	A	A	A	A	A

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Table 24A. (cont.)

Bear ID	Sex/age	1980	1981	1982	1983	1984	1985
1982 captures							
373	M/9 in '82	-	-	A	--*	--*	
379**	F/5 in '82	-	-	A	A	A	
380	F/15 in '82	-	-	A	Shot-F	-	-
381	F/3 in '82	-	-	A	A	A	
1983 captures							
385	F/2 in '83	-	-	-	A	A	A
386	M/2 in '83	-	-	-	A	Shot-Sp	-
388	F/14 in '83	-	-	-	A	A	-
389	M/2 in '83	-	-	-	A, Died Oct.	-	-
390	M/2 in '83	-	-	-	A	ND	
384	F/12 in '83	-	-	-	A	Lost in Sept., shot?	-
391	M/2 in '83	-	-	-	A	Shot-F	-
392	M/2 in '83	-	-	-	A	Shot-Sp	-
393	F/2 in '83	-	-	-	A	ND	
394	F/6 in '83	-	-	-	A	Shot-F	-
395	F/3 in '83	-	-	-	Shot-F	-	-
396	F/13 in '83	-	-	-	A	A	A
397	F/2 in '83	-	-	-	A	A	A
398	F/2 in '83	-	-	-	A	A	A
399	M/9 in '83	-	-	-	A	A	A
400	M/20 in '83	-	-	-	A	A	
403**	F/6 in '83	-	-	-	A	A	
407**	F/4 in '83	-	-	-	A	A	A
1984 captures							
420	F/A in '84	-	-	-	-	A	
422	M/A in '84	-	-	-	-	A	
423	F/A in '84	-	-	-	-	A	
425	F/A in '84	-	-	-	-	A	
382	F/2 in '84	-	-	-	-	A	

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Table 24A. (cont.)

Bear ID Sex/age	1980	1981	1982	1983	1984	1985
A. Max. No. marked bears potentially alive in year, includes ND. Excludes tagging and natural mortalities (M:F)	23(13:11)	31(14:17)	30(12:18)	44(18:26)	45(16:29)	37(12:25)
B. No. KNOWN shot in year (M:F)	1(1:0)	3(3:0)	1(1:0)	3(1:2)	6(5:1)	ND
Min. % known shot (B/A)	4%	10%	3%	7%	13	ND
C. No. known shot plus suspected (unreported) shot in year (M:F)	1(1:0)	4(3:1)	1(1:0)	3(1:2)	8(5:3)	ND
Probable min. % shot (C/A)	4%	13%	3%	7%	18	ND
D. No. bears known alive (excludes ND, died, lost, cubs or ylgs)	20	26	27	40	36	ND
Probable % shot (C/D)	5%	15%	4%	8%	22%	ND
Cumulative % shot (based on bear-years available, from row A).	4%	7%	6%	6%	8%	ND

Not Included:

Subadults @2=1980: 285,
1983: 397 & 398 both recaptured in 1985
Subadults @1=1980: 298;
1983: 382;
1984: 421, 417, 418, 419

* Shed collar, had no eartags or tattoo so was not recognizable as a marked bear subsequently

** Downstream study area

Table 24B. Summary of Tables 22-24, hunter killed brown bear marked in GMU 13.

	1978	1979	1980	1981	1982	1983	1984	1985
Maximum No. of marked bears potentially alive in year (includes N.D.) (M:F)	28(15:13)	51(28:33)	72(39:34)	75(36:39)	70(32:38)	80(36:44)	75(28:47)	64(22:42)
No. marked bears shot in year* (M:F)	1(0:1)	2(2:0)	6(5:1)	7(5:2)	5(3:2)	8(6:2)	11(7:4)	ND
Min. % of marked bears shot in year	4%	4%	8%	9%	7%	10%	15%	ND
% males in population of marked bears	54%	55%	54%	48%	46%	45%	37%	ND
% males in harvest of marked bears	0	100%	83%	71%	60%	75%	64%	1978-1984 70%

* includes row C in Table 15

Table 25. Annual use of Prairie Ck. area by radio-collared brown bears during July and August king salmon spawning period (1980-1985). Reproductive status reflects July data for females (c=newborn cubs).

Males (age in year first captured)	1980	1981**	1982	1983	1984***	1985****
214 @ 4(80)	no	shed	-	-	-	no
279 @ 9(80)	ND(shed)	ND	ND	yes	yes	dead
280 @ 5(80)	no	no	no	no	no	no collar
282 @ 4(80)	-	-	yes	yes	yes	yes
293 @ 3(80)	yes	yes	yes	no	(shed)	-
294 @ 10(80)	yes	yes	-(dead)	-	-	-
342a*@ 2(81)	-	no	no	no	yes (dead)	-
373 @ 9(82)	-	-	yes	ND(shed)	-	-
382 @ 2(84)	-	-	-	-	-	yes
386 @ 2(83)	-	-	-	no	dead	-
389 @ 2(83)	-	-	-	no	dead	-
390 @ 2(83)	-	-	-	no	missing	-
391 @ 2(83)	-	-	-	no	dead	-
392 @ 2(83)	-	-	-	no	dead	-
399 @ 9(83)	-	-	-	yes	yes	missing
400 @ 20(83)	-	-	-	no	no	missing
422 @ A(84)	-	-	-	-	yes	dead
427 @ A(85)	-	-	-	-	-	yes
Subtotals for MALES:						
No. using Prairie Ck. (males)	2	2	3	3	4	3
Total No. of collared males	4	4	5	12	8	4
No. collared males excluding subadult dispersers	4	3	4	7	8	4
Subadult dispersers out of study area (Bear ID)	-	342a	342a	342a, 386, 389, 391, 392	-	-
% males using Prairie Ck. (excludes dispersers)	50	67	75	43	50	75

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Table 25. (cont.)

Females (age in year first captured)	1980	1981**	1982	1983	1984***	1985****
273 @ 9(85)	-	-	-	-	-	no, alone
277 @ 10(80)	no?	ND-(shed)	ND	ND	ND	ND
281 @ 3(80)	no, alone	no, alone	no, alone	no, alone	no, alone	no w/2c
283 @ 12(80)	yes, alone	no, w/2c	yes, alone	yes, alone	yes, alon	yes, w/2c
299 @ 13(80)	no, w/2@1	no, alone	no, alone	no, w/3c	no, w/3@1	missing
308b @ 5(80)	yes, alone	no?, alone	-dead	-	-	-
312 @ 10(80)	no, alone	no, w/1c	no, w/1@1	no, alone	dead	-
313 @ 9(80)	no, alone	no, alone	no, w/2c	no, w/1@1	no, alone	missing
314 @ 7(85)	-	-	-	-	-	no, alone
315 @ 2(80)	-	-	-	yes, alone	yes, alone	missing
331 @ 6(81)	-	no, alone	-dead	-	-	-
334 @ 10(81)	-	no, alone	-missing	-	-	-
335 @ 2(81)	-	no, alone	no, alone	no, alone	no, w/2c	no, w/2@1
337 @ 13(81)	-	no, w/3c	no, w/1@1	no, alone	no, w/2c	no, w/2@1
340 @ 3(81)	-	no, alone	no, alone	no, alone	no, w/2c	no, w/2@1
341 @ 6(81)	-	no, alone	no,w/2c	-missing	-	no, alone
344 @ 5(81)	-	no, w/2c	no, w1@1	no, alone	no, alone	missing
379* @ 5(82)	-	-	no, w/2c*	no, w/2@1*	no, alone?*	no, alone*
380 @ 15(82)	-	-	yes, w/2@1	yes, alone	dead	-
381 @ 3(82)	-	-	no, alone	no, alone	no, alone	no, w/2c
384 @ 12(83)	-	-	-	-	no, w/2c	missing
385 @ 2(83)	-	-	-	no, alone	no, alone	no collar
388 @ 14(83)	-	-	-	no, alone	no, alone	no, w/2c
393 @ 2(83)	-	-	-	no, alone	dead	-
394 @ 6(83)	-	-	-	yes, alone	yes - dead	-
395 @ 3(83)	-	-	-	no, alone	dead	-
396 @ 13(83)	-	-	-	yes, alone	yes, alone	yes, alone
397 @ 4	-	-	-	-	-	yes, alone
398 @ 4	-	-	-	-	-	yes, alone
403* @ 6(83)	-	-	-	no, w/2c*	no, w/1@1?*	no, alone
407* @ 4(83)	-	-	-	yes, alone*	yes, alone*	yes, alone
420 @ 19(84)	-	-	-	-	yes, w/2@1	yes, alone
423 @ A(84)	-	-	-	-	yes, w/3c	yes, w/3/@1
425 @ A(84)	-	-	-	-	no, alone	no, w/2c
437 @ 2 (85)	-	-	-	-	-	no, alone
447 @ A (85)	-	-	-	-	-	no, alone

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Table 25. (cont.)

Females (age in year first captured)	1980	1981**	1982	1983	1984***	1985***
Subtotals for FEMALES						
No. using Prairie Ck. (females)	2	0	2	6	7	7
Total No. of collared females	7	13	13	22	21	21
% females using Prairie Ck.	29	0	15	27	33	33
TOTALS:						
No. bears using Prairie Ck.	4	2	5	9	11	10
No. bears radio-collared (excluding dispersing males)	11	16	17	29	29	25
% bears using Prairie Ck.	36	13**	29	31	38	40

* Bear occurs in the downstream study area
** Poor monitoring conditions in 1981
*** Intensively monitored in 1984
**** No routine monitoring, monitored only on 7/23-27 and 8/6 because of study termination

Table 26A. Results of brown bear census on Prairie Creek in 1984. Flights started at 0800 hrs. and pilot Al Lee flew the plane. Bear IDs are given in parenthesis. Includes only bears older than 2.0.

Date of flight	7/29	8/1
Minutes spent on survey	82	94
Number of adult unmarked brown bears seen	14	17
Number of marked bears seen (R)	1 (399)	2 (399, 407)
Number of marked bears present but not seen	4 (407, 282, 394, 420)	2 (420, 394)
Number of marked bears in the general areas but outside of search pattern	3 (315, 423, 396)	5 (282, 315, 423, 396, 283)

		(95% CI)		(95% CI)
M (# of marks present) =	5		4	
C (# of bears seen) =	15		19	
R (# of marks seen) =	1		2	
(M+1)(C+1)(R+1) = N =	48	(12-180)	33	(10-62)
MC/R =	75		38	

Table 26B. Brown bear census on Prairie Creek, July-August 1985.

Parameter	7/23/85 PM	7/24/85 AM	7/24/85 PM	7/25/85 AM	7/25/85 PM	7/26/85 AM	7/26/85 PM	7/27/85 AM	8/6/85* PM
Time Start	1945	0752	1945	0755	2010	0753	2014	0755	1948
Time End	2108	0933	2145	1000	2148	0926	2155	0923	2144
Total minutes searching (additional minutes spent radio tracking)	83 (27)	101 (37)	120 (5)	125 (21)	98 (17)	93 (24)	101 (35)	88 (33)	116 (23)
number of black bears taken	1	0	1	1	0	1	1	1	0
A) Unmarked brown bears (≥2.0) spotted during search	4	5	16	16	12	8	17	9	11
B) Additional unmarked brown bears (≥2.0) spotted in search area during tracking	3	0	0	0	2	2	3	0	0
C) Total unmarked brown bears (2.0) verified as present (A+B)	7	5	16	16	14	10	20	9	11
D) No. of cubs w/bears in C (# litters)	0	2(1)	7(4)	6(3)	4(3)	2(2)	2(1)	0	3(2)
E) No. of ylgs w/bears in C (# litters)	2	2(2)	3(1)	4(3)	2(1)	0	4(2)	3(2)	1(1)
F) Total unmarked bears verified as percent (C+D+E)	9	9	26	26	20	12	26	12	15
G) IDs of marked bears spotted (No. = "R")	282 =1	0	420,398 =2	398,420, 396 =3	420 =1	420 =1	0	398 =1	407, 423 (w/3@1)=5
H) Total no. of bears spotted (F+G = "C")	10	9	28	29	21	13	26	13	20
I) IDs of marked bears that were present in the search area that were not spotted during the search	420,398, 396=3	420,398, 396,282 =4	396,282 =2	282 =1	398,396, 282 =3	398,396, 282 =3	398,420 282 =3	420,396, 282 =3	382,398,397, 427,282,420, 396,and 283 (w/2c)=10
J) Total no. of marked bears present in search area (none of these had cubs or ylgs) (G+I = "M")	4	4	4	4	4	4	3	4	15(5@c)
K) IDs of marked bears present in general area but not in search area N=(M+1)(C+1)/(R+1)	397	383,397	382,397	397	397	397,382?	396,397, 382	382	
	28	-	48	38	55	35	-	35	56

* Flight on 8/6/85 was in a 180 w/3 observers and area was incompletely covered

Table 27. Results of intensive monitoring of brown bear predation rates during spring 1984. Bears were monitored twice/day from 5/29-6/7 and once/day from 6/8-7/1, conditions permitting. When two bears were on a kill each was credited with half of the kill unless the bear that made the kill was known.

Bear ID	Sex	Age	Repro. status	Obsv. period	No. of locations	No. of visuals	% visuals	No. calf moose kills	No. non-calf moose kills	No. species age unknown kills	No. of suspected kills	Total known/suspected ungulate kills
MALES												
382	M	2	--	5/28-7/1	41	29	71	1	0	2	0	3
282	M	8	--	6/1-7/1 less 6/8-6/15	25	20	80	2	0.5*	0	4	6.5
280	M	9	--	5/28-6/24 less 6/10-22	30	24	80	0	0	0	3	3
399	M	10	--	5/28-6/24	28	22	79	2	0	0	0	2
279	M	13	--	5/26-6/12	24	23	96	0.5	1	0	0	1.5
400	M	21	--	5/30-6/29	23	21	91	1	0	0	0	1
422	M	A	--	5/28-7/1	32	25	78	3	0	0	1	4
ALL MALES					203	164	81	9.5	1.5	2	8	21
FEMALES												
381	F	5	estrus	5/28-6/30 less 6/11-6/22	24	21	88	1	0	1	0	2
281	F	7	estrus	5/26-7/1	39	26	67	1	0	0	1	2
313	F	13	estrus	5/26-7/1	42	33	79	7.5	1	0	0	8.5
388	F	15	estrus	5/30-7/1	29	23	79	0	0	0	0	0
283	F	16	estrus	5/28-7/1	40	33	83	0	1	0	0	1
425	F	A	estrus	6/1-7/1 less 6/8-6/15	24	18	75	0	0.5*	0	0	0.5
Misc. marked females w/o offspring (315, 344, 385, 394, 396)**					24	20	83	0	1	0	1	2
	Subtotals (FF w/o offspring)				222	174	78	9.5	3.5	1	2	16
340	F	6	w/2@c	5/28-7/1	41	37	90	1*	2	0	0	3

(continued)

Table 27. (cont'd)

Bear ID	Sex	Age	Repro. status	Obsv. period	No. of locations	No. of visuals	% visuals	No. calf moose kills	No. non-calf moose kills	No. species age unknown kills	No. of suspected kills	Total known/suspected kills
Misc. females with cubs (337, 423, 335, 384)**	--				36	31	86	0	1	0	0	1
299	F	17	w/3@1	5/28-7/1	38	36	95	2	0	0	0	2
420	F	A	w/2@1	6/1-7/1	37	33	89	4	0	0	0	1
	Subtotal (FF with offspring)				152	137	90	7	3	0	1	11
	ALL FEMALES				374	311	83	16.5	6.5	1	3	27
ALL BROWN BEARS (BOTH SEXES)					577	475	82	26	8	3	11	48

SUMMARY

Category	Number of known kills/100 visuals	Number of known or suspected kills/100 visuals	Number of known moose calf kills/100 visuals
All males	7.9	12.8	5.8
All females	7.4	8.7	5.3
Females w/cubs	5.9	5.9	1.5
Females w/ylgs	8.7	8.7	8.7
Females w/offspring	7.3	8.0	5.1
All bears	7.8	10.1	5.5

* Wolves were also seen at this kill along with the brown bear which had possession of the kill.

** These individuals were not monitored intensively but were monitored occassionally during this study period.

Table 28. Results of intensive monitoring of brown bear predation rates during summer 1984. Bears were located once/day from 23 July through 1 August, conditions permitting.

Bear ID	Sex	Age	Repro. status	No. of locations	No of visuals (%)	No. of locations at salmon streams	No. of visuals at salmon streams (%)	Total known or suspected kills of ungulates
MALES								
282	M	8	--	9	4	9	4	0
382	M	2	--	5	1	0	0	0
280	M	9	--	4	1	0	0	0
399	M	10	--	9	5	9	5	0
279	M	13	--	6	3	6	3	0
400	M	21	--	6	0	0	0	0
422	M	A	--	6	5	0	0	1
342	M	5	--	5	1	5	1	0
	Subtotals for males			50	20(40.0%)	29	13(44.8%)	1
FEMALES								
381	F	5	alone	4	0	0	0	0
281	F	7	alone	6	0	0	0	0
313	F	13	alone	6	2	0	0	0
388	F	15	alone	4	1	0	0	0
283	F	16	alone	8	2	1	1	0
425	F	A	alone	6	2	0	0	0
315	F	6	alone	8	5	8	5	0
394	F	7	alone	8	1	8	1	0
396	F	15	alone	6	2	5	1	0

(continued)

Table 28. (cont'd)

Bear ID	Sex	Age	Repro. status	No. of locations (%)	No of visuals (%)	No. of locations at salmon streams	No. of locations at salmon streams (%)	Total known or suspected kills of ungulates
407	F	6	alone	6	5	6	5	0
344 & 385	F	--	alone	2	2	0	0	0
340	F	6	w/2@0	6	6	0	0	0
423	F	A	2/3@0	9	7	7	5	0
335	F	6	w/2@0	5	3	0	0	0
337	F	10	w/2@0	2	2	0	0	0
299	F	18	w/3@1	6	6	0	0	0
420	F	A	w/2@1	9	5	9	5	0
	Subtotals for females			101	51(50.5%)	44	23(52.3%)	0
TOTALS FOR ALL BEARS				161	71(44.1%)	73	36(49.3%)	1

* Note that if the same ratio of kills to visuals observed in the spring (48:475) were present in the summer, then 7.2 kills would have been observed during the 71 visual observations made. Excluding the observations at salmon streams leaves only 35 visual observations and 3.5 kills would have been expected with this number of observations using the ratio of kills:visual observations observed in the spring.

Table 29. Black bears captured in Susitna Dam Studies as of July, 1985

Tattoo	Capture Sex	Capture Age	Capture Wt.	Capture Date	Serial #	Ear Tags	Comments
(287)	M	10.5	225*	5/1/80		1083/1084	Shot on 9/8/82
(288)	F	10.5	125*	5/1/80		1095/1083	w/2 ylgs, turgid, collar shed by 8/27/80
289	F	9.5	130*	5/2/80		1103/1104	w/2 ylgs, turgid, had 3 cubs in 1981, see 4/82 recapture
(290)	F	8.5	103	5/2/80		1306/1305	w/2 ylgs, turgid, see 8/6/81 recapture
(291)	M	(3.5)	73	5/2/80		-- --	Post-capture mortality
(296)	M	(10.5)	227	5/3/80		-- --	Capture mortality
(300)	M	(7.5)	274	5/4/80		-- --	Post-capture mortality
(301)	F	(7.5)	115	5/4/80		1043/1044	w/1 ylg, turgid, had 2 cubs in 1981, see 3/83 recapture, shot 9/84
(302)	M	8.5	287	5/4/80		1106/1105	collar shed by 8/4/80, recaptured 5/9/81
(303)	M	(8.5)	217	5/4/80		(1055/1056)	shot 9/8/83
(304)	M	10.5	235	5/4/80		1315/1316	collar shed in 1982
(305)	M	(9.5)	217	5/5/80			Shot by hunter 8/30/80
(307)	M	2.5	105	5/5/80		1123/1124	Shot by hunter on 5/17/81
310	M	2.5	85	5/6/80		(1122/1121)	recaptured 6/85
(316)	F	(12.5)	150*	5/7/80		-- --	w/1 newborn & 1 ylg shot by hunter 8/28/80
317	F	7.8	133	8/18/80		1195/1196	w/2 cubs, see 3/83 recapture
(318)	F	5.8	126	8/18/80		1046/1045	w/1 cub, immobilized in den 3/81, 3/83 and 5/85 recaptures, shed 7/83
(319)	M	3.8	174	8/18/80		1194/1193	died summer 1981
(320)	M	(4.8)	200*	8/18/80		-- --	shot by hunter 9/9/80
321	F	10.8	175*	8/18/80		1243/1244	had 2 cubs in 1981, recaptured 5/15/83
(322)	M	4.8	154	8/19/80		1087/1088	w/324, collar shed in 80/81 den, see 5/26/82 recapture, died 1982
323	M	2.8	122	8/18/80		1200/1199	see 3/83 recapture
(324)	M	(5.8)	190	8/19/80		(1252/1251)	w/322, see 3/83 recapture, shot 9/84
(325)	F	11.8	164	8/18/80		1191/1192	collar shed in 80/81 den, see 8/6/81 recapture
(326)	F	(5.8)	125	8/19/80		-- --	w/2 cubs, shot by hunter 8/28/80
(327)	F	(5.8)	118	8/19/80		1247/1248	w/2 cubs, immobilized in den 3/81, 3/83
328	F	6.8	150	8/19/80		1246/1245	collar shed 81/82 den, recaptured 5/16/84
(303#2)	M	(8.8)	260	8/19/80		-- --	recapture, shot 9/8/83
329	F	1.3	15*	3/23/81		1266/1265	w/327 and sibling, w/heavy collar, see 4/82 & 3/83 recaptures
318#2	F	6.3	--	3/25/85		same	in den
(330)	M	1.3	31	3/25/81		1276/1275	w/318, died summer 1981
(342B)	M	(5.5)	165	5/7/81		1206/1205	cinnamon color, shot on 9/15/81
343	M	5.5	184	5/7/81		1214/1213	alone, Devil Mountain, recaptured 5/16/83
(346)	M	(9.5)	175*	5/9/81		1226/1184	alone, see 3/83 recapture, died 6/84
302#2	M	9.5	300*	5/9/81		1257/1105	alone, old collar previously shed
(290#2)	F	9.8	160+*	8/6/81		1306/1279	neck infected, collar not replaced
(304#2)	M	11.8	--	8/6/81		1286/1316	collar replaced, shed 6/82
(325#2)	F	12.8	150*	8/6/81		1191/1192	second collar shed in 81/82 den
(303#2)	M	(9.8)	250*	8/7/81		(1055/1056)	collar replaced, shot 9/8/83
(287#2)	M	11.8	200*	8/7/81		(1083/1084)	collar replaced, shot on 9/8/82
(348)	M	9.8	300*	8/6/81		1131/1132	alone, shot on 9/82
349	F	4.8	170*	8/6/81		1326/1325	alone, see 3/83 recapture, shed 7/83, recaptured 5/16/84
329#2	F	2.3	29	4/1/82		same	recapture in den, see 3/83 recapture
289#2	F	11.3	112	4/1/82		same	recapture in den w/350 and 351
350	M	1.3	14	4/1/82		514/513	capture in den
351	M	1.3	16	4/1/82		516/515	capture in den, recaptured 6/4/85
(352)	M	2.5	100*	5/26/82		--	capture mortality
(353)	M	1.5	29	5/26/82		--	capture mortality of B301's yearling
354	F	5.5	150*	5/26/82		517/1600	w/2 cubs, recaptured 5/18/84
355	F	0.5	4*	5/26/82		518/519	w/354, no tattoo
356	M	0.5	4*	5/26/82		520/521	w/354, no tattoo
(357)	M	4.5	113	5/26/82		501/1651	died winter 82/83
(322#2)	M	(6.5)	90*	5/27/82		1662/525	recapture, previous shed collar, died summer '82
(358)	F	(2.5)	60*	5/27/82		502/1656	recaptured 5/15/84, died 8/84

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Table 29. (continued)

Tattoo	Capture Sex	Age	Wt.	Date	Serial #	Ear Tags	Comments
359	M	4.5	118	5/27/82		512/1655	recaptured 5/15/84
(360)	M	7.5	250*	5/27/82		511/1657	----, collar shed 6/84
361	F	7.5	175*	5/27/82		522/1596	see 3/83 recapture
362	F	2.5*	40*	5/27/82		503/504	no tattoo
363	F	4.5	120*	5/27/82		505/1593	----
364	F	9.5	170*	5/27/82		521/1591	missing since Sept.'82, recaptured 5/18/84
(365)	M	5.5	100*	5/28/82		523/1626	downstream study, see 3/83 recapture-collar loosened, died 9/83
(366)	M	6.5	200*	5/28/82		538/1627	downstream study, shot on 8/5/82
(367)	F	4.5	100*	5/28/82		524/1579	downstream study, shot, see below - 4/16/83 recapture
(368)	F	3.5	110*	5/28/82		--	capture mortality, downstream study
369	F	4.5	90*	5/28/82		527/1578	downstream study - age based on '83 tooth, recaptured 4/83, 4/84 tag shed 7/84
370	F	7.5	220*	5/28/82		528/1577	downstream study
(371)	M	2.5	150*	5/28/82		--	capture mortality, downstream study
372	F	9.5	135*	5/28/82		537/1576	downstream study
(374)	F	7.5	125*	6/11/82		(530/1584)	w/1@1, downstream study, recaptured 5/19/83, shot 9/83, aged + 1 ('83)
375	F	9.5	160*	6/11/82		507/1630	w/3@1, downstream study, recaptured 5/19/83, age changed (+ 4)
376	F	6.5	125*	6/11/82		531/1587	w/1@1, downstream study, see 9/2/82 recapture
377	F	4.5	126	6/11/82		509/1659	downstream study, recaptured 5/19/83, age changed (- 1)
378	F	6.5	175*	6/11/82		510/1628	downstream study
376#2	F	6.7	160*	9/2/82		530/1584	recapture, slough 8B, snare
(301#2)	F	(10.3)	135	3/20/83	6298	same	w/2@0, recapture in den, collar shed 7/83, shot 9/84
317#2	F	10.3	--	3/23/83	6338	1547/1196	w/2@0, recapture in den
(318#2)	F	8.3	--	3/23/83	(6351)	same	w/2@0, recapture in den, shed 7/83
323#2	M	5.3	--	3/21/83	6264	1696/1650	recapture in den
(324#2)	M	8.3	--	3/22/83	(6443)	(1661/1251)	recapture in den, shot 9/84
329#3	F	3.3	56	3/22/83	same	same	recapture in den, old collar loosened
(327#2)	F	8.3	--	3/23/83	(6416)	same	w/2@0, recapture in den, died summer 1983
(346#2)	M	11.3	--	3/21/83	12449	same	recapture in den, died 6/84
(349#2)	F	6.3	--	3/22/83	(6446)	same	w/2@0, recapture in den, shed 7/83
361#2	F	8.3	--	3/21/83	(6305)	same	w/4@0, recapture in den, recaptured 4/84, 2/85
(365#2)	M	6.3	--	3/23/83	(same)	same	recapture in den, collar loosened, died 9/83
(379)	F	9.3		3/24/83	(6449)	none	w/3@0, captured in den #19, died 7/83
369#2	F	5.3	--	4/14/83	same	same	collar loosened in den, no cubs, recaptured 4/84
372#2	F	10.3	--	4/15/83	same	same	w/3@0, collar loosened in den
376#3	F	6.3	--	4/16/83	same	same	w/3@0, collar okay in den
370#2	F	8.3	--	4/16/83	same	same	w/2@0, collar loosened in den
(367#2)	F	5.3	--	4/16/83	(same)	same	collar loosened in den, no cubs, shot July 1983
378#2	F	7.3	--	4/16/83	same	same	w/2@0 (not sexed or weighed), collar okay in den
387	M	4.5	175*	5/14/83	6288	2126/2127	--
321#2	F	13.5	115	5/15/83	15286	same	had cubs (n=?), not captured
343#2	M	7.5	225*	5/16/83	15287	same	--
401	M	3.5	96	5/18/83	15280	2103/2102	--
402	F	10.5	130	5/18/83	3616	2373/2372	w/3@1, not captured, Downstream study
375#2	F	10.5	--	5/19/83	same	same	w/1@0, not captured, old collar loosened, age changed + 4 ('83 tooth)
(374#2)	F	8.5	120*	5/19/83	(same)	(same)	w/3@0, all captured, old collar loosened, shot 9/83, aged + 1
010	F	0.5	--	5/19/83	--	1351/1352	w/374, no tattoo
011	F	0.5	--	5/19/83	--	1354/1353	w/374, no tattoo
012	F	0.5	--	5/19/83	--	1356/1355	w/374, no tattoo
377#2	F	5.5	--	5/19/83	15282	same	alone, collar replaced, neck infected, age changed - 1 ('83 tooth)
404	F	11.5	135*	5/19/83	15272	2449/2450	w/1@0, captured, Downstream study, recaptured 3/85
013	F	0.5	10	5/19/83	--	2449/2450	no tattoo, w/404, Downstream study
405	F	17.5	180*	5/19/83	6314	2418/2417	W/2@0, both captured, Downstream study
014	F	0.5	6.5	5/19/83	--	1364/1366	w/405, Downstream study, no tattoo
015	F	0.5	6.0	5/19/83	--	1365/1366	w/405, Downstream study, no tattoo

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Table 29. (continued)

Tattoo	Capture Sex	Age	Wt.	Date	Serial #	Ear Tags	Comments
406	F	11.5	125*	5/19/83	15273	2444/2445	w/2@0, not captured, Downstream study
408	M	3.5	160*	5/19/83	15274	2119/2120	alone, Downstream study
409	F	5.5	90*	5/19/83	6310	1527/1526	alone, Downstream study
(410)	F	7.5	120*	5/19/83	(6262)	(1536/1537)	w/2@0, not captured, Downstream study, shot 7/19/83
411	F	8.5	130*	5/19/83	6402	1548/1549	w/2@1, not captured, Downstream study
363#2	F	6.3	--	4/6/84	6280	same	w/2@0, recaptured in den, replaced collar
--	M	0.3	6.0	4/6/84	--	12/20	w/363 in den, neck = 190mm
--	M	0.3	6.8	4/6/84	--	11/24	w/363 in den, neck = 192mm
361#3	F	9.3	--	4/6/84		same	w/3@1, recaptured in den, collar good fit, replaced 2/85
412#2	M	1.3	30*	4/6/84	--	1678/2122	w/361 in den, neck = 285mm, 25+ lbs
413#2	F	1.3	30*	4/6/84	--	2476/2428	w/361 in den, neck = 286mm, 25+ lbs
414#2	F	1.3	19.5	4/6/84	--	2439/2432	w/361 in den, neck = 263mm
(360#2)	M	9.3	--	4/7/84	6307	same	recaptured in den, replaced collar, shed 6/84
329#4	F	4.3	75*	4/7/84	17919	same	recaptured in den #73, alone
289#3	F	13.3	--	4/7/84	6291	same	w/1@1, recaptured in den, collar replaced, recaptured 3/85
415	F	1.3	23.5	4/7/84	--	1582/1590	w/289 in den
369#3	F	6.3	--	4/8/84	6282	same	w/2@0, recaptured in den, replaced collar, ear tag 1578 found 7/84
--	M	0.3	4.0	4/8/84	--	3/4	w/369 in den
--	F	0.3	3.8	4/8/84	--	22/6	w/369 in den
(358#2)	F	(4.5)	70	5/15/84	(6319)	same	sex changed, died 8/84
359#2	M	6.5	131	5/15/84	6406	same	alone, collar replaced
302#3	M	12.5	350*	5/15/84	17920	same	old collar not working
416	M	9.5	230*	5/15/84	6312	2064/2054	(poor tooth age)
349#2	F	7.5	72	5/16/84	6316	1326/1325	old collar previously shed, recaptured 2/85
328#2	F	10.5	110	5/16/84	6451	1246/1245	old collar previously shed
364#2	F	11.5	108	5/18/84	6355	1591/526	old collar not working
354#2	F	7.5	108	5/18/84	6354	1600/517	with cubs
361#4	F	10.3	140*	2/25/85	6400	same	w/3@2 in den, collar applied loosely
412#3	M	2.3	80*	2/25/85	--	same	w/361 in den, applied green visual dropoff
413#3	F	2.3	65*	2/25/85	--	same	w/361 in den, applied red visual dropoff
414#3	F	2.3	55*	2/25/85	--	same	w/361 in den, applied white visual dropoff
349#3	F	8.3	--	2/28/85	same	same	in den w/at least 2@0, collar loosened 1½
001	M	0.3	1.8	2/28/85	--	--	w/349, at least one sibling not handled
289#4	F	14.3	--	3/1/85	same	same	w/at least 2@0 in den, cubs not handled
328#3	F	11.3	--	3/29/85	same	same	w/3@0 in den, loosened collar 1½ notches, rubbed
002	M	0.3	5.0	3/29/85	--	--	w/B328 and siblings
003	M	0.3	4.1	3/29/85	--	--	w/B328 and siblings
004	F	0.3	4.1	3/29/85	--	--	w/B328 and siblings
404#2	F	13.3		3/30/85	same	same	w/3@0 in den, collar fine
005	M	0.3	4.1*	3/30/85	--	--	w/B404 and siblings
006	M	0.3	4.1*	3/30/85	--	--	w/B404 and siblings
007	F	0.3	3.5*	3/30/85	--	--	w/B404 and siblings
(426)	M	(3.5)	75*	6/1/85	--	--	capture mortality
428	M	6.5*	175*	6/1/85	6336	2109/2167	rot-away canvas spacer
430	M	A	285*	6/2/85	3603	2093/2088	rot-away canvas spacer
431	F	A	116	6/2/85	3617	1519/1520	----
310#2	M	7.5	225*	6/2/85	6347	2185/2183	rot-away canvas spacer
432	F	A	124	6/2/85	6353	1558/1557	w/ylg. 434
434	F	1.5	33	6/2/85	--	1552/1572	w/B432
433	M	3.5*	68*	6/2/85	--	1647/2081	----
435	M	A	200*	6/2/85	6351	2182/2186	----
436	M	2.5*	40*	6/3/85	--	--/2121	w/B364-mother?
438	F	A	130*	6/3/85	6262	1516/1521	w/B439 & sibling (#444?)
439	M	2.5*	40*	6/3/85	--	--/--	w/B438-injured in left rear leg during darting
441	F	A	195	6/4/85	6307	2361/2362	----

(on next page)

Table 29. (continued)

Tattoo	Capture Sex	Age	Wt.	Date	Serial #	Ear Tags	Comments
351#2	M	4.5	140	6/4/85	--	2169/2175	old tags left in too (516/515)
444	M	3.5*	78	6/4/85	--	2154/2153	drop-off visual collar
445	M	A	250*	6/4/85	6984	2068/2164	drop-off collar
(446)	F	A	99	6/5/885	--	--/--	capture mortality
448	F	A	100	6/5/85	15211	1544/1533	----
318#4	F	10.5	--	6/5/85	--	same	w/2@1 (not captured), recapture
449	M	A	165*	6/9/85	--	1640/2188	alone
451	F	?	54	6/10/85	--	2408/2484	alone

* Weight or age estimated, ( ) shed or replaced collar or dead bear, # recapture, __subsequently changed, Last Tattoo used = 425, last cub = 25.

Table 30. Predicted and observed spring 1984 reproductive status of radio-collared female black bears.

ID	1984 age	Predicted* 1984 status	Comments	Observed 1984 status
321	14	cubs	lost '83 litter in May	2 cubs
349	7	cubs	apparently lost '83 litter, shed collar recaptured 5/84	alone
354	7	cubs	weaned '83 yearlings	2 cubs
363	6	cubs	alone in '83	2 cubs
369**	6	cubs?	first litter expected in '84	2 cubs (Aug.)
377**	6	cubs	apparently lost '83 litter, shed collar	alone***
402**	11	cubs	weaned '83 yearlings	alone
409**	6	cubs	apparently alone in '83	NA
411**	9	cubs	weaned '83 yearlings	2 cubs
289	13	1 ylg	cubs in '83	w/1@1
317	11	1 ylg	cubs in '83	w/1@1
361	9	3 ylgs	cubs in '83	w/3@1
375**	11	1-2 ylgs	cubs in '83	w/2@1
376**	8	3 ylgs	cubs in '83	w/3@1
378**	8	2 ylgs	cubs in '83	w/2@1
404**	12	1-2 ylgs	cubs in '83, last seen in July '83	NA
405**	18	2 ylgs	cubs in '83	w/2@1
406**	12	2 ylgs	cubs in '83	w/2@1
329	4	barren?	first litter expected in 1985	barren

* See Miller (1984:117)
** bear occurs in the downstream study area
*** heard at least one cub in den on 4/8/84, none seen post-exit

Table 31. Predicted and observed spring 1985 reproductive status of radio-collared female black bears.

ID	1985 age	Predicted* 1985 status	Comments	Observed 1985 status
349	8	cubs	cubs expected last year	2 cubs
402**	12	cubs	cubs expected last year	2 cubs
289	14	cubs	ylgs last year, bred	2 cubs
317	12	cubs	ylgs last year, bred	2 cubs
361	10	cubs	3 ylgs last year	w/3 @2 in den
364	9	cubs	ylgs in last year	alone (? w/1@2?)
375**	12	cubs	ylgs last year	NA (shot)
376**	9	cubs	ylgs last year	alone?
378**	9	cubs	ylgs last year	1 cub
404**	13	cubs	status in '84 unknown - should have had ylgs	3 coy
405**	19	cubs	ylgs last year	w/2@2
406**	13	cubs	ylgs last year	missing
377**	7	cubs	last year's litter possibly lost in den	2 cubs
329	5	cubs ?	first litter expected	alone
328	11	cubs	bred in '84	3 cubs
321	15	1 ylg	cubs in '84	1 ylg
354	8	1-2 ylgs	2-1 cubs in '84	alone
363	7	2 ylgs	cubs in '84	2 ylgs
369**	7	2 ylgs	cubs in '84	1 ylg +
409**	7	ylgs ?	'84 status unknown, should have had cubs	alone
411**	10	2 ylgs	cubs in '84	2 ylgs

* predicted in January 1985
** bear occurs in the downstream study area
*** heard at least one cub in den on 4/8/84, none seen past exit

Table 32. Summary of black bear litter size data based on observations of bears with litters of newborn cubs.

MOTHER'S ID (age-year)	LITTER SIZE	COMMENTS
B289 (10 in spring '81)	3	lost 1 in August, 2 survived
B289 (12 in spring '83)	2	lost 1 cub in Sept., other survived to den exit
B301 (8 in spring '81)	2	both survived to yearling age
B301 (10 in spring '83)	2(in den) [2 at exit]	survivorship undetermined, female shed collar
B317 (7 in summer '80)	2(summer)	initial capture in summer, both survived to fall, cubs not seen with bear at initial capture
B317 (10 in '83)	2(in den) [2 at exit]	lost 1 in June, other survived to den exit
B318 (5 in summer '80)	1(summer)	survived
B318 (8 in '83)	2(den) [2 at exit]	both lost by 6/6/83 apparently, shed collar
B328 (7 in summer '81)	2(summer)	bred in 1980. Lost 1 by 7/29/81, shed collar in den (not sure if survived until exit)
B326 (5 in summer '80)	2(summer)	bear shot in 1980, cubs may have been adopted by B317
B321 (11 in spring '81)	2	no cubs in summer 1980, both cubs lost by 8/24/81, no litter in '82,no litter verified in 1983 but may have lost a litter early in 1983, bred in 1983
B321 (14 in '84)	2	lost 1 of 2 by 6/29, other survived to den entrance
B327 (5 in summer '80)	2(summer)	both survived to yearling age
B327 (8 in '83)	2(den) [2 at exit]	cubs survived into June, female died in July
B349 (6 in spring '83)	2(den) [0 at exit?]	first litter, no cubs in summer '81 or spring '82, cubs apparently lost in May '83, collar shed in July - No ylgs on 5/84
B354 (5 in '82)	2	both survived to den entrance, at least 1 ylg. at exit in '83

(table continued on next page)

Table 32. (cont'd)

MOTHER'S ID (age-year)	LITTER SIZE	COMMENTS
B354 (7 in '84)	2	May have lost 1 by den enterence date.
B361 (8 in '83)	4(in den) [3 at exit]	lost 1 in den prior to exit, others survived to den exit in '84
B370 (8 in '83)	2(in den) [2 at exit]	bear missing after 5/23/83, cubs alive at that time
B363 (6 in '84)	2 (in den) [2 at exit]	None lost to den entrance
B369* (6 in '84)	2 (in den) [2 at exit]	None lost to den entrance
B372* (10 in '83)	3(in den) [3 at exit]	lost 1 in early July, others survived to 7/20, female lost in Sept., '83.
B374* (7 in '83)	3	think lost 2 in July, bear shot in Sept., '83.
B375* (6 in '83)	2	both survived to exit in '84.
B376* (5 in '83)	3(in den) [3 at exit]	all survived to exit in '84.
B377* (5 in '83)	[1-2??] NOT COUNTED	cubs may have been lost prior to or during capture, cubs not seen during capture but saw at least 1 cub 9 days earlier on 5/10/83
B377 (6 in '84)	some (in den) [0 at exit]	heard at least 1 cub in den, none seen at exit.
B378* (7 in '83)	2(den) [2 at exit]	both survived to '84 den exit.
B379 (9 in '83)	3(den) [2 at exit]	lost all cubs by 5/23/83, bred again, died in July
B404* (11 in '83)	1	survived thru 7/20/83 at least, not seen in '84.
B405* (17 in'83)	2	both survived to den exit in '84
B406* (11 in '83)	2	both survived to den exit in '84.
B409* (7 in '84)	?	not observed in '84.
B410* (7 in '83)	2	both survived thru June, bear shot in July
B411* (9 in '84)	2	status at entrance into '84 den. unk.

Table 32 (cont'd)

Total number of cubs	number of litters	mean litter size (range)	comments(includes)
69	32	2.2(1-4)	all cub litters counted at earliest observation
54	25	2.2(1-3)	spring observations only (w/o den data or summer litters)
60	26	2.3(1-4)	earliest observation excluding summer litters
31	13	2.4(2-4)	observations in dens only

* Downstream study area

Table 33. Summary of black bear litter size data based on observations of bears with litters of yearlings.

MOTHER'S ID (age-year)	LITTER SIZE	COMMENTS
B288 (10 in 1980)	3	Bred in 1980, ylgs. with female into August, shed collar in 1980
B290 (8 in 1980)	2	weaned by 6/23/80, bred in 1981, collar removed on 8/5/81 (neck scarred)
B289 (9 in 1980)	2	weaned by 5/22/80, bred, 3 cubs in '81
B289 (13 in 1984)	1	with mom to Sept., bred in June.
B289 (11 in 1982)	2(in den)	weaned by 6/9/82, bred, had 2 cubs in 1983
B301 (7 in 1980)	1	weaned by 6/12/80, bred, had 2 cubs in 1981
B301 (9 in 1982)	2	weaned by 6/17/82, bred, had 3 cubs in 1983
B317 (8 in 1981)	2	weaned by 6/18/81, bred, 1 ylg returned and was with female until 9/9/81, no cubs in 1982
B317 (11 in 1984)	1	weaned in June, bred
B318 (6 in 1981)	1(den)	ylg (B330) weaned by 5/29/81, bred, ylg died by 8/24/81 , no (reason?) cubs in 1982, bred again, 2 cubs in 1983
B327 (5 in 1981)	2(den)	ylg B329 and sibling, sibling weaned by 6/5/81, B329 by 6/21, bred, no cubs in 1982, bred again, cubs in 1983
B354 (6 in 1983)	1(?)	at least 1 ylg exited den (perhaps both?), weaned by 6/2/83
B364 (8 in 1984)	3	2 weaned early, bred, still with one in September.
B402* (10 in 1983)	3	weaned in early July
B411* (8 in 1983)	2	weaned after 6/13

(table continued on next page)

Table 33. (cont'd)

MOTHER'S ID (age-year)	LITTER SIZE	COMMENTS
B361 (9 in 1984)	3	with mom to October '84.
B375* (11 in 1984)	2	weaned in June
B376* (8 in 1984)	3	weaned 2 in June, 1 with mom in October.
B378* (8 in 1984)	2	Not seen after June
B404* (12 in 1984)	[?]	'84 status not verified
B405* (18 in 1984)	2	with mom into August
B406* (12 in 1984)	2	weaned by September

Total number of ylgs. observed	number of litters	mean litter size (range)	comments
42	21	2.0(1-3)	all litters with ylgs. counted

* Downstream study area

Table 34. Summary of known losses of black bear cubs-of-the-year. Losses calculated during first season out of den (in dens or at emergence from dens as cubs to entrance into dens as cubs)

Year	Upstream study area	downstream study area	Both areas
1980	no data	no data	--
1981	4 of 9 lost (289, 301, 321, 328)	no data	4 of 9 lost
1982	0 of 2 lost (354)	no data	0 of 2 lost
1983 complete data	8 of 13 lost (289, 317, 361, 349)	1 of 12 lost (375, 376, 377**, 378, 405, 406)	9 of 25 lost
1983 incomplete data*	[2 of 2 lost (318]	[3 of 6 lost (372, 374)]	[5 of 8 lost]
1984 complete data	1 of 4 lost (321, 363)	0 of 2 lost (369)	1 of 6 lost
1984 incomplete data*	[1 of 2 lost (354)]	[1 of ? lost (377)]	[1 of 2 lost]
TOTALS (all years)	13 of 28 = 46% lost	1 of 14 = 7% lost	14 of 42 = 33% lost

* incomplete data resulted from not observing the family status of the bear before it entered its winter den, shed collars, collar failures, or early hunter kills. Tabulated losses occurred prior to loss of the female to these causes. These are not included in totals.

** B377 may have lost 2 of 2 rather than the 1 of 1 tabulated in 1983, the initial litter size was not known with certainty.

Table 35. Sex ratio and morphometrics of black bear cubs-of-year handled in the Susitna Hydro Project.

CUB ID	MOTHER'S ID	DATE HANDLED	SEX	WT(lbs)	COMMENTS
355	B354	26 May 1982	F	--	ear tags
356	B354	26 May 1982	M	--	ear tags
--	B301	20 March 1983 (den)	F	2.6	
--	B301	20 March 1983 (den)	F	2.5	
--	B361	21 March 1983 (den)	M	3.5	
--	B361	21 March 1983 (den)	F	3.8	
--	B361	21 March 1983 (den)	F	3.5	
--	B361	21 March 1983 (den)	F	2.8	
--	B349	22 March 1983 (den)	F	3.5	
--	B349	22 March 1983 (den)	F	3.4	
--	B317	23 March 1983 (den)	M	4.3	neck=175mm
--	B317	23 March 1983 (den)	M	4.3	neck=180mm
--	B318	23 March 1983 (den)	M	2.8	
--	B318	23 March 1983 (den)	F	2.7	
--	B327	23 March 1983 (den)	M	5.3	neck=190mm
--	B327	23 March 1983 (den)	F	4.5	neck=180mm
--	B379	24 March 1983 (den)	M	2.8	
--	B379	24 March 1983 (den)	M	3.3	
--	B379	24 March 1983 (den)	M	3.3	
--	B372	15 April 1983 (den)	F	3.7	
--	B372	15 April 1983 (den)	F	4.1	
--	B372	15 April 1983 (den)	M	4.5	
--	B376	16 April 1983 (den)	M	6.0	neck=190mm
--	B376	16 April 1983 (den)	F	5.5	neck=190mm
--	B376	16 April 1983 (den)	F	5.8	neck=190mm
--	B370	16 April 1983 (den)	F	7.5	neck=200mm
--	B370	16 April 1983 (den)	F	7.0	neck=190mm
010	B374	19 May 1983	F	--	neck=175mm, ear tags
011	B374	19 May 1983	F	--	neck=200mm, ear tags
012	B374	19 May 1983	F	--	neck=195mm, ear tags

(table continued on next page)

Table 35 (cont'd)

CUB ID	MOTHER'S ID	DATE HANDLED	SEX	WT(lbs)	COMMENTS
013	B404	19 May 1983	F	10.0	neck=215mm, ear tags
014	B405	19 May 1983	F	6.5	neck=180mm, ear tags
015	B405	19 May 1983	F	6.0	neck=175mm, ear tags
--	B363	6 April 1984 (den)	M	6.0	neck=190mm
--	B363	6 April 1984 (den)	M	6.8	neck=192mm
--	B369	8 April 1984 (den)	M	4.0	
--	B369	8 April 1984 (den)	F	3.8	
--	B349	28 Feb. 1985 (den)	M	1.8	very small, eyes closed, sibling not handled
--	B328	29 March 1985 (den)	M	5.0	
--	B328	29 March 1985 (den)	M	4.1	
--	B328	29 March 1985 (den)	F	4.1	
--	B404	30 March 1985 (den)	M	4.1*	
--	B404	30 March 1985 (den)	M	4.1*	
--	B404	30 March 1985 (den)	F	3.5*	

Totals: 19 males and 25 females, In dens=18 males and 18 females.

* Estimated

Table 36. Morphometrics of black bear yearlings handled in the Susistna Hydro Project.

YLG ID	MOTHER'S ID	DATE HANDLED	SEX	WT(lbs)	COMMENTS
B329	B327	23 March 1981 (den)	F	15 (est.)	tagged and collared
B330	B318	25 March 1981 (den)	M	31	tagged and collared
B350	B289	1 April 1982 (den)	M	14	ear tagged
B351	B289	1 April 1982 (den)	M	16	ear tagged
B353	B301	26 May 1982	M	29	with mother, capture mortality
B412	B361	6 April 1984 (den)	M	30*	
B413	B361	6 April 1984 (den)	F	30*	
B414	B361	6 April 1984 (den)	F	19.5	
B415	B289	7 April 1984 (den)	F	23.5	Neck=299mm

Totals: 5 males and 4 female

Table 37. Summary of apparent natural mortalities of radio-collared adult bears. Susitna Hydro project. Includes black bears ≥1 year of age and brown bears ≥2 year of age.

Bear ID	sex/age (at death), reprod. status	Comments
Black bears		
B291	M/3	Died 2-28 July, 1980, 2 months after capture, cause of death unknown.
B300	M/7	Died 6-14 May, 1980, 2-10 days after capture, cause of death unknown but capture myopathy possible (M99/Rompun used, immobilization and recovery were apparently normal).
B288	F/10 with 3c	Not sure bear died but suspect that it did and collar was moved away from carcass by predator. Probably died 22-27 August, 1980, 6 months after capture.
B319	M/4	Died 29 July-4 August, 1981, 11 months after capture, cause unknown.
B330	M/1	Died 17-24 August, 1981, 5 months after capture in den with mother and sibling, apparently killed and eaten by predator. Radio-collared female sibling survived (B329).
B357	M/4	Died winter of 1981, 6 months after capture, apparently killed by another bear (species?) at or near its den and eaten.
B322	M/6	Died 24-29 June, 1982, 4 weeks after recapture (was very skinny and weighed an est. 90 lbs), cause unknown.
B327	F/8 with 2c	Died 20 June-1 July, 1983, 4 months after recapture in den, killed by predator (probably bear) but not eaten (cub defense?).
B379	F/9 with 3c	Died early July, 1983 (?), 3 months after recapture in den, canine punctures in scapula, in brown bear habitat, lost cubs earlier. Suspect was killed by brown bear.
B365	M/6	Died Oct. 1983, 9 months after recapture in den. Scavenged (killed?) by wolves. Guess may have been wounded by hunter (no evidence). Good condition.
B346	M/12	Died in May 1984, eaten by unknown predator-suspect a brown bear.
Brown bears		
G331	F/7	Died 1-31 July, 1982, 14 months after capture, cause of death unknown, had no cubs in 1982 but should have (weaned 2@2 in 1981). Bones not scattered. Weighed 284 lbs. on 5/81 (large).
G389	M/2	Died early October, 1983. Cause undetermined.

Table 38. Status of black bears marked during Su-Hydro studies, 1980-1983. (A=alive, ND=no data, F=shot in fall season, Sp=shot in spring season, S=Summer capture or mortality).

Bear ID	Sex/Age	1980	1981	1982	1983	1984	1985
Upstream Study Area							
287	M/10 in '80	A	A	Shot-F	-	-	-
288	F/10 in '80	A(shed)	ND	ND	ND	ND	
289	F/9 in '80	A	A	A	A	A	
290	F/8 in '80	A	A(remvd)	ND	ND	ND	
301	F/7 in '80	A	A	A	A(shed)	Shot-F	
302	M/8 in '80	A	A	A	A	A	
303	M/8 in '80	A	A	A	Shot-F	-	-
304	M/10 in '80	A	A	A(shed)	ND	ND	
305	M/9 in '80	Shot-F	-	-	-	-	-
307	M/2 in '80	A	Shot-S	-	-	-	-
310	M/2 in '80	ND	ND	ND	ND	ND	
316	F/12 in '80	Shot-F	-	-	-	-	-
317	F/7 in '80	A-S	A	A	A	A	
318	F/5 in '80	A-S	A	A	ND-shed	ND	
319	M/3 in '80	A-S	died	-	-	-	-
320	M/4 in '80	Shot-F	-	-	-	-	-
321	F/10 in '80	A-S	A cubs	A	A	A	
322	M/4 in '80	A-S	A	died	-	-	-
323	M/2 in '80	A-S	A	A	Shot-F	-	-
324	M/5 in '80	A-S	A	A	A	Shot-F	-
325	F/11 in '80	A-S	A	Shed	ND	ND	
326	F/5 in '80	Shot-F	-	-	-	-	-
327	F/5 in '80	A-S	A	A	Died-S	-	-
328	F/6 in '80	A-S	A	A	A	A	
329	F/1 in '81	-	A	A	A	A	
330	M/1 in '80	-	died-S	-	-	-	
342b	M/5 in '81	-	Shot-F	-	-	-	
346	M/9 in '81	-	A	A	A	died	-
348	M/9 in '81	-	A-S	Shot-F	-	-	
349	F/4 in '81	-	A-S	A	A	A	
354	F/5 in '82	-	-	A	A	A	
357	M/4 in '82	-	-	died-W	-	-	
358	M/2 in '82	-	-	A	A	died-F	-
359	M/4 in '82	-	-	A	A	A	
360	M/7 in '82	-	-	A	A	A	
361	F/7 in '82	-	-	A	A	A	
362	F/2 in '82	-	-	ND	ND	ND	
363	F/4 in '82	-	-	A	A	A	
364	F/9 in '82	-	-	A	A	A	
379	F/9 in '83	-	-	-	died-S	-	
387	F/4 in '83	-	-	-	A	A	
401	M/3 in '83	-	-	-	A	A	
416	M/A in '84	-	-	-	-	A	

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Table 38. Cont.

		1980	1981	1982	1983	1984	1985
Upstream subtotals							
Maximum No. bears potentially alive (includes ND) in year (excludes natural mortalities (M:F)		24(12:12)	24(12:12)	30(13:17)	28(11:17)	25(8:17)	ND
No. known shot (M:F)		4(2:2)	2(2:0)	2(2:0)	2(2:0)	2(1:1)	ND
No. additional bears suspected shot (M:F)		0	0	0	0	0	ND
% known or suspected shot		17%	8%	7%	7%	8%	ND
Downstream Study Area							
343	M/5 in '81	-	A	A	A	A	
365	M/5 in'82	-	-	A	Died-F	-	-
366	M/6 in '82	-	-	Shot-F	-	-	-
367	F/4 in '82	-	-	A	Shot-S	-	-
369	F/4 in '82	-	-	A	A	A	
370	F/7 in '82	-	-	A	(Shot?)-S	-	-
372	F/9 in '82	-	-	A	(Shot?)-S	-	-
374	F/7 in '82	-	-	A	Shot-F	-	-
375	F/5 in '82	-	-	A	A	A	
376	F/6 in '82	-	-	A	A	A	
377	F/5 in '82	-	-	A	A	A	
378	F/6 in '82	-	-	A	A	A	
402	F/10 in '83	-	-	-	A	A	
404	F/11 in '83	-	-	-	A	A	
405	F/17 in '83	-	-	-	A	A	
406	F/11 in '83	-	-	-	A	A	
408	M/3 in '83	-	-	-	A	A	
409	F/5 in '83	-	-	-	A	A	
410	F/7 in '83	-	-	-	Shot-S	-	-
411	F/8 in '83	-	-	-	A	A	
Downstream subtotals							
Max. No. bears potentially alive (includes ND) in year (excludes natural mortalities) (M:F)		-	1(1:0)	12(3:9)	18(2:16)	13(2:11)	ND
No. known shot (M:F)		-	0	1(1:0)	3(0:3)	0	ND
No. additional bears suspected shot (M:F)		-	0	0	2(0:2)	0	ND
% known or suspected shot		-	-	8%	28%	0	ND

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Table 38. Cont.

	1980	1981	1982	1983	1984	1985
Upstream & Downstream Areas Combined						
Total bears potentially alive in year (excludes natural mortalities, includes ND) (M:F)	24(12:12)	25(13:12)	42(16:26)	46(13:33)	38(10:28)	ND
No. known shot (M:F)	4(2:2)	2(2:0)	3(3:0)	5(2:3)	2(1:1)	ND
No. additional bears suspected shot (M:F)	0	0	0	2(0:2)	0	ND
% known or suspected shot	17%	8%	7%	15%	5%	ND

Table 39. Comparisons of berry abundance in 4 transects in 1982, 1983, 1984 & 1985, (10 plots of one square meter/transect) in the impoundment study area.

	Transect 1				Transect 4				Transect 2			
Location	Between Vee Canyon and Oshetna (upstream)				Confluence of Susitna R. and Deadman (downstream)				Vee Canyon-Oshetna Ck. (upstream)			
Elevation	2325 feet				2100 feet				3050 feet			
Aspect	218°				239°				216°			
Slope	8°				4°				5°			
Vegetation type	WSB				WSB				B*			
Date	8/21/82	8/18/83	8/23/84	8/30/85	8/21/82	8/18/83	8/22/84	8/30/85	8/21/82	8/18/83	8/23/84	8/30/85
Blueberries (Vaccinium uliginosum)												
No. berries	303	238	110	160	32	41	45	34	489	1104	287	333
range (no/plot)	1-191	0-120	0-38	6-26	0-8	0-19	1-11	0-11	0-164	59-202	4-66	0-119
S.D.	57	39	11	8	3.2	6.2	3.0	3.7	54.9	53.6	23.3	36.2
% canopy cover:												
mean	21.2	24.0	21	60	31	22.5	30.5	35.0	36.0	41.0	24.5	40.0
range	5-60	10-40	10-40	40-90	15-70	10-60	15-40	20-50	5-80	15-70	5-55	15-70
S.D.	15.9	11.3	10.2	19.3	17.9	15.9	8.6	12.5	24.6	19.3	16.9	18.1
Lowbush cranberry (V. vitis-idaea)												
No. berries	28	94	109	199	0	127	302	19	45	604	688	908
range	0-15	0-23	0-100	0-58	-	0-114	0-283	0-19	0-16	4-109	3-140	6-206
S.D.	5.1	9.1	31.3	19.6	-	35.6	88.9	-	-	36.7	51.3	67.5
% canopy cover:												
mean	3.4	15.1	24.5	26.0	3.9	9.3	10.1	7.0	6.7	36.5	40.5	23.5
range	0-10	1-50	0-55	10-60	0-15	0-25	0-30	0-30	2-10	15-80	15-85	5-70
S.D.	3.5	14.8	16.7	17.6	5.1	11.7	12.2	8.6	3.0	19.6	24.4	23.2
Crowberries (Empetrum nigrum)												
No. berries	17	65	0	8	112	614	145	178	200	452	26	672
range/plot	0-10	0-39	-	-	0-58	0-261	0-68	0-56	0-50	0-169	0-14	0-251
S.D.	3.1	13.0	-	-	17.9	80.8	21.3	21.8	19.7	52.8	4.5	78.5
% Canopy cover:												
mean	2.9	8.0	8.0	3.0	10.2	18.5	38	51	10.9	18.0	25.0	22.5
range	0-10	0-30	0-30	0-20	0-30	5-35	5-80	20-70	0-50	0-50	0-60	0-60
S.D.	3.4	8.9	9.8	6.3	10.2	11.1	25.5	14.5	14.5	17.5	21.3	21.4
Bearberry (Arctostaphylos uva-ursi)												
No. of berries	22	22	9	0	0	0	0	0	0	0	1	0
range/plot	0-20	0-19	0-6	-	-	-	-	-	-	-	-	-

(continued on next page)

Table 39 (continued)

	Transect 3			
Location	Middle Deadman-Watana Camp (downstream)			
Elevation	2450 feet			
Aspect	201°			
Slope	7°			
Vegetation type	B			
Date	8/21/82	8/18/83	8/22/84	8/30/85
Blueberries (Vaccinium uliginosum)				
No. berries	77	297	175	281
range (no/plot)	0-31	0-119	1-43	2-68
S.D.	11.7	39.4	15.2	24.1
% canopy cover:				
mean	57.0	44.5	52.0	68
range	15-80	30-70	20-80	50-90
S.D.	23.0	15.0	21.4	13.2
Lowbush cranberry (V. vitis-idaea)				
No. berries	23	102	35	275
range	0-15	0-33	0-55	0-97
S.D.	-	11.5	5.5	33.8
% canopy cover:				
mean	8.7	20.0	23	15.5
range	0-30	10-60	10-70	10-30
S.D.	8.6	15.5	18.0	7.3
Crowberries (Empetrum nigrum)				
No. berries	1	344	14	10
range/plot	-	0-128	0-7	-
S.D.	-	40.1	-	-
% Canopy cover:				
mean	0.4	16.5	9.5	4.0
range	0-2	0-30	0-55	0-20
S.D.	-	11.1	17.2	6.6
Bearberry (Arctostaphylos uva-ursi)				
No. of berries	0	0	0	0
range/plot	-	-	-	-

* Transect #2 was clearly in a birch shrub type although according to the vegetation map it was in woodland black spruce (WSB).
** Not in same place as previous years probably - couldn't find flagging

		on 8/23/84 =	on 8/30/85 =
Berryweights on 8/18/83=			
for V. vitis-idaea	130 gms/1000	128 gms/1000	131/1000 (N=1399)
for V. uliginosum	304 gms/1000	346 gms/1000	253/1000 (N=808)
for E. nigrum	260 gms/1000	217 gms/1000	212/1000 (N=868)

Table 40. Subjective characterization of berry abundance in the upstream study area since 1980.

Year	Characterization of Berry Abundance	Comments
1980	normal	No special effort was made to evaluate berry abundance, black bears were very common in the shrublands adjacent to forested habitats and in forested habitats.
1981	very poor	Extensive unanticipated movements of radio-marked black bears in late summer provided first clue that something was amiss. On the ground inspection supported hypothesis that blueberries were very scarce. Bears were in very poor condition the following spring in both upstream and downstream area. Three marked black bears died (Table 34) in 1981 following the summer berry failure. Bears were common in semi-open shrublands.
1982	slightly subaverage	Berry transects supported hypothesis that berries were more abundant in shrublands than in adjacent forests. Low reproductive success evident in spring 1982 and bears tended to be very skinny. In summer bears foraged in shrublands but there appeared to be many fewer bears in the study area than in 1980. Would have concluded a massive emmigration in 1981 except that the marked bears that moved away had all returned. Possibly there was an increased mortality rate resulting from the 1981 berry failure. One marked bear died in 1982 compared to 3 in the previous and following years. Mortality could have been most marked on subadults, only 2 of these were radio-marked.

(cont'd on next page)

Table 40. (continued)

Year	Characterization of Berry Abundance	Comments
1983	above average	Berry transects suggest more berries than in 1982, especially crowberries and lowbush cranberries. Although not evident in the transect data it appeared that blueberries were locally very abundant in forested habitats and bears did not have to, and didn't, move into the shrubland habitat types to forage for berries in late summer. Some black bears expected to produce their first litters in 1983 failed to do so suggesting delayed age of first reproduction may have resulted from 1981 berry failure. Appeared to be many fewer bears present than in 1980. Craig Gardner noted that along the Denali highway "Berries were very abundant along the Denali Hwy from Paxton to the McClaren River."
1984	below average	Berry transects support substantially fewer blueberries and crowberries in upstream areas, about average in downstream areas. Berries appeared to be very abundant in highly localized pockets, more patchy than is typically the case. Black bear movements appeared normal but some brown bears made atypically large movements in fall 1984. Between Paxton and the McClaren River, Craig Gardner (pers. comm.) reported "Berries were less abundant than in 1983 but more abundant than in 1981."
1985		In the vicinity of Watana Camp berries appeared to be slightly below average in abundance. In more upstream habitat they appeared to be slightly above average. Saw nowhere where blueberries were really thick, pretty well dispersed. Along the Denali Hwy both Craig Gardner and Jack Whitman noted independently that berry crops "appeared to be a bust" - very few were seen.

Table 41. Home range sizes for the Su Hydro downstream black bears.

ID (age in first year monitored)	1982 Observation Period (No. of Locations)	1982 Home Range (km^2)	1983 Observation Period (No. of Locations)	1983 Home Range (km^2)	Comments
MALES					
408 (3)	---	---	May-Oct (16)	227	
365 (5)	May-Sep (11)	656	May-Sep (15)	252	died 9/83
366 (6)	May-Aug (10)	136	shot 9/82	--	
FEMALES					
369 (4)	May-Sep (18)	10	May-Oct (20)	26	
367 (4)	May-Sep (17)	18	May-Jul (9)	4	
377 (4)	Jun-Sep (15)	12	May-Oct (18)	25(w/cubs)*	
409 (5)	--	--	May-Oct (16)	26	
376 (6)	Jun-Sep (13)	21	May-Oct (21)	34(w/3@c)	
378 (6)	Jun-Sep (14)	8	May-Oct (20)	10(w/2@c)	
370 (7)	May-Sep (18)	16	May [4]	--(w/cubs)	lost 5/83
374 (7)	malfunction[3]	--	May-Sep (16)	30(w/3@c)	shot 9/83
410 (7)	--	--	May-Jul (9)	19(w/2@c)	shot 7/83
411 (8)	--	--	May-Oct (17)	31	
372 (9)	May-Sep (17)	56	May-Aug (13)	76(w/2@c)	lost 9/83
375 (9)	Jun-Sep (16)	17	May-Jul (9)	4(w/2@c)	
402 (10)	--	--	May-Oct (17)	13	
404 (11)	--	--	May-Oct (16)	36(w/1@c)	
406 (11)	--	--	May-Oct (17)	18(w/2@c)	
405 (17)	--	--	May-Oct (17)	25(w/2@c)	
$\bar{x}$(all females) =	(16.0)	19.8	(15.7)	25.1	
S.D. =	1.9	15.3	4.0	17.3	
range =	(13-18)	8-56	(9-21)	4-76	
$\bar{x}$(all males and females) =	14.9	95.0	15.7	50.4	
S.D. =	2.9	200.9	3.7	73.2	
range =	(10-18)	(8-656)	(9-21)	(4-252)	

* litter lost in May

Table 42. Home range sizes for Su-Hydro upstream study area black bears. (Includes individuals with 5 or more relocations).

Bear ID (age @ capture)	1980 Obs. Period (No. locations)	1980 Home Range (km^2)	1981 Obs. Period (No. locations)	1981 Home Range (km^2)	1982 Obs. Period (No. locations)	1982 Home Range (km^2)	1983 Obs. Period (No. location)	1983 Home Range (km^2)
Males								
330 (1)	---	---	May-Oct (14)	10	dead 7/81	---	---	---
323 (2)	Aug-Oct (6)	20	May-Oct (19)	383	May-Oct (20)	1126	May-Sep (17)	1089(shot 9/83)
358 (2)	---	---	---	---	May-Oct (17)	11	May-Oct (17)	53
319 (3)	May-Jul (6)	67	May-Jul (10)	43	dead 7/81	---	---	---
401 (3)	--	--	--	---	--	--	May-Oct (18)	91
291 (4)	May-Jul (7)	20	Dead 7/80	---	---	---	---	---
322 (4)	Aug-Oct (5)	10	Shed 12/80	---	May-Jul (7)	21	dead 7/82	
359 (4)	---	---	---	---	May-Oct (18)	83	May-Oct (19)	154
357 (4)	---	---	---	---	May-Oct (18)	11	dead 10/82	---
387 (4)	---	--	--	--	--	---	May-Oct (16)	164
324 (5)	Aug-Oct (6)	29	May-Oct (20)	248	May-Oct (21)	140	May-Oct (17)	170
342B(5)	---	---	May-Sep (40)	611	shot 9/81	---	---	---
343 (5)	---	---	May-Oct (16)	289	May-Oct (19)	370	May-Oct (20)	501
302 (8)	May-Jul (6)	4	May-Oct (36)	326(shed)	May-Jul (11)	51	missing	--
303 (8)	May-Oct (15)	95	May-Oct (18)	93	May-Oct (20)	74	May-Aug (11)	43(shot 9/83)
305 (9)	May-Aug (9)	48	shot 8/80	---	---	---	---	---
346 (9)	---	---	May-Oct (16)	62	May-Oct (22)	91	May-Oct (16)	119
348 (9)	---	---	Aug-Oct (7)	389	May-Jun (9)	136	shot 9/82	---
287(10)	May-Oct (17)	136*	May-Oct (15)	268*	May-Sep (18)	250	shot 9/82	---
304(10)	May-Sep (15)	35*	May-Oct (18)	41*	shed 7/82	---	---	---
$\bar{x}$(all males)=	(9.2)	46.0	(18.3)	230.3	(16.7)	197.0	(16.8)	253.8
S.D. =	--	42.0	--	184.5	--	311.0	--	343.4
range =	(5-17)	4-136	(7-40)	10-611	(9-22)	11-1126	(11-20)	43-1089

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Table 42. (continued)

Bear ID (age @ capture)	1980 Obs. Period (No. locations)	1980 Home Range (km^2)	1981 Obs. Period (No. locations)	1981 Home Range (km^2)	1982 Obs. Period (No. locations)	1982 Home Range (km^2)	1983 Obs. Period (No. locations)	1983 Home Range (km^2)
FEMALES								
329 (1)	---	---	May-Oct (19)	15	May-Oct (19)	9	May-Oct (18)	24
363 (3)	---	---	---	---	May-Oct (18)	20	May-Oct (18)	21
349 (4)	---	---	Aug-Oct (6)	36	May-Oct (20)	47	May-Jul (8)	16(shed)
318 (5)	Aug-Oct (6)	25(w/1@c)	May-Oct (20)	1036	May-Oct (20)	472	May-Jul (7)	4(shed)
327 (5)	Aug-Oct (6)	3(w/2@c)	May-Oct (35)	31	May-Oct (19)	34	May-Jul (9)	6(dead)
354 (5)	---	---	---	---	May-Oct (19)	65(w/2@c)	May-Oct (17)	62
328 (6)	Aug-Oct (6)	4	May-Oct (19)	28(w/2@c)	shed 12/81	---	---	---
301 (7)	May-Oct (20)	18	May-Oct (15)	13(w/2@c)	May-Oct (18)	18	May-Jul (9)	(w/2@c)(shed)
317 (7)	Aug-Oct (6)	4(w/2@c)	May-Oct (19)	14	May-Oct (18)	44	May-Oct (19)	17(w/1@c)
360 (7)	---	---	---	---	May-Oct (20)	145	May-Oct (19)	299
361 (7)	---	---	---	---	May-Oct (18)	88	May-Oct (16)	60(w/3@c)
290 (8)	May-Oct (18)	45	May-Aug (15)	116	collar removed	---	---	---
289 (9)	May-Oct (14)	43	May-Oct (20)	26(w/3@c)	May-Oct (20)	29	May-Oct (17)	19(w/2@c)
364 (9)	---	---	---	---	May-Sep (16)	122	lost 9/82	---
379 (9)	---	--	---	---	---	---	May-Jul (8)	29(w/2@c)(dead)
288(10)	May-Aug (16)	7	shed 8/80	---	---	---	---	---
321(10)	Aug-Oct (6)	3	May-Oct (14)	771(w/2@c)	May-Oct (20)	14**	May-Oct (18)	29
325(11)	Aug-Oct (6)	8	Aug-Oct (9)	136	shed 12/81 & 12/80	---	---	---
$\bar{x}$(all Females)=	(10.4)	16	(16.7)	200	(18.9)	85.2	(14.1)	45.2
S.D.=	---	16	---	355	---	123.7	---	78.5
Range=	(6-20)	3-45	(6-34)	12-1036	(16-20)	9-472	(7-19)	4-299
$\bar{x}$(all Males & Females)=	(9.8)	31	(17.9)	216.7	(17.8)	133.9	(15.2)	130.5
S.D.=	---	35	---	273	--	236.3	--	243.8
Range=	(5-20)	3-136	(6-40)	10-1036	(9-22)	9-1126	(7-20)	4-1089

* Excludes atypical location of 80/81 den
** Cubs lost in Aug.

Table 43. Number of Susitna River crossings by radio-marked black bears, 1980-1983.

Bear ID	Yr. initial capture (age)	No. river crossings by upstream bears 1980	1981	1982	1983	1984	Comments
Males (upstream)							
416	1984(A)	-	-	-	-	1	active
330	1981(1)	-	0	-	-	-	318's cub, died fall '81
323	1980(2)	2	4	2	3	-	-dead (in hunter's cabin)
358	1982(2)	-	-	0	2	0	natural mortality 7/84
319	1980(3)	4	3	-	-	-	dead, 9/81
401	1983(3)	-	-	-	2	8	active
291	1980(4)	0	-	-	-	-	dead 8/80
322	1980(4)	0	-	1	-	-	dead 6/82, (shed collar '81, recap '82)
320	1980(4)	1	-	-	-	-	shot (hunter) 9/80
357	1982(4)	-	-	4	-	-	dead 3/83
359	1982(4)	-	-	0	0	8	active
387	1983(4)	-	-	-	0	0	active
324	1980(5)	0	4	4	4	0	shot (hunter) 9/84
342B	1981(5)	-	0	-	-	-	shot (hunter) 9/81
343	1981(5)	-	3	3	2	4	active
300	1980(7)	-	-	-	-	-	dead 5/80
360	1982(7)	-	-	2	4	0	shed collar 4/84
302	1980(8)	0	12	2	-	2	collar shed '80; recaptured but radio failure in 1982
303	1980(8)	2	0	0	0	-	shot (hunter) 9/83
305	1980(9)	2	-	-	-	-	shot (hunter) 8/80
346	1981(9)	-	2	4	8	0	natural mortality 5/84
348	1981(9)	-	2	1	-	-	shot (hunter) 9/82
287	1980(10)	0	2	2	-	-	shot (hunter) 9/82
304	1980(10)	0	0	1	-	-	shed collar 5/82
Total males (upstream)		11	32	26	25	23	

Table 43. (continued)

Bear ID	Yr. Initial capture (age)	No. River Crossings by upstream bears 1980	1981	1982	1983	1984	Comments
Females (upstream)							
329	1981(1)	-	2	2	5	10	327's cub
349	1981(4)	-	0	0	0	0	shed collar 7/83
363	1982(4)	-	-	0	0	0_{*2}	active
379	1983(4)	-	-	-	0	-	dead; possibly killed by other bears
318	1980(5)	0_{*1}	0	0	0	-	shed collar
326	1980(5)	0	-	-	-	-	shot
327	1980(5)	1_{*2}	8_{y1}	7	1_{*2}	-	dead 7/83
354	1982(5)	-	-	0_{*2}	0	0_{*2}	active
328	1980(6)	-	0_{*2}	0	-	0	shed collar 1982, active
364	1982(6)	-	-	7	-	6_{y1}	missing ** 9/82
301	1980(7)	2	0_{*2}	0	-	-	shed collar 8/83
317	1980(7)	0_{*2}	0_{y1}	0	0_{*1}	0_{y1}	active
361	1982(7)	-	-	2	0_{*3}	0_{y3}	active
290	1980(8)	4_{*1}	0	-	-	-	not recollared (infected neck)
289	1980(9)	4	0_{*3}	0_{y1}	1_{*2}	5_{y1}	active
288	1980(10)	0_{*3}	-	-	-	-	shed collar 9/80
321	1980(10)	0	2_{*2}	0	0	0_{*1}	active
325	1980(11)	0	2	-	-	-	shed collar 1981, 1982
316	1980(11)	0	2	-	-	-	shed collar 1981, 1982
Total females (upstream)		11	14	18	7	21	
Total both sexes (upstream)		22	46	44	32	44	

(continued)

Table 43. (continued)

Bear ID	Yr. Initial capture (age)	No. of River Crossings by downstream Bears 1982	1983	1984	Comments
Males (downstream)					
408	1983(3)	-	0	2	active
365	1982(5)	0	0	-	dead 9/83
366	1982(6)	1	-	-	shot 8/82
Total Males		1	0	2	
Females (downstream)					
369	1982(3)	0	0	0_{*2}	active
367	1982(4)	0	0	-	shot ("DLP")
377	1982(4)	2	3	3	active
409	1983(5)	-	0	0	active
376	1982(6)	2_{y1}	4_{*3}	2_{y3}	active
378	1982(6)	0	0_{*1}	0_{y2}	active
410	1983(7)	-	0	-	shot ("DLP" 7/83)
374	1982(7)	0	0_{*3}	-	shot 9/83
370	1982(7)	0	0_{*2}	-	missing**
411	1983(8)	-	2_{y2}	2_{*2}	active
375	1982(9)	5	4_{*1}	3_{y2}	active
372	1982(9)	0	0_{*2}	-	missing**
402	1983(10)	-	2_{y3}	2	active
404	1983(11)	-	2_{*1}	2	active
406	1983(11)	-	0_{*2}	0_{y2}	missing 10/84
405	1983(17)	-	-	0_{y3}	active
Total females (downstream)		9	17	14	
Total both sexes (downstream)		10	17	16	

** possible unreported hunter kill, collar failure, or emigration.

Reprod. status: * = cub of year y = yrlg.

Table 44. Scat analyses of brown bear and black bear scats collected in the Su-Hydro study area, 1984. (Analyses done by Paul Smith, ADF&G, Soldotna). Values are % volume (T=trace, 2=6-25%, 3=26-50%, 4=51-75%, 5=76-100%).

Date Collected	Species of bear	Place	Sample No.	Comments	1	2	3	4	5	6	9	11	12	13	14	15	16	17	18	19	
Summer - Fall - Sloughs																					
8/3/84	?	upstm	6	1700' elev.		2		2									T				4
8/5/84	?	upstm	19	Watana Camp	2	2					3					T				3	
8/5/84	?	upstm	4	Watana Camp		T										2	T			5	
8/15/84	?	dstm	55	Lane Ck.					4									2	2		
8/15/84	?	dstm	60	Slough 8B					3		3								2		
8/15/84	?	dstm	64	Portage Ck. S.					5										T		
8/15/84	?	dstm	65	McKensie Ck.					5												
5/15/84	?	dstm	66	Lane Ck.					5										T		
8/16/84	?	dstm	28	Slough 28					5								T	T			
8/16/84	?	dstm	29	Slough 8A					4					T				2			
8/16/84	?	dstm	30	Slough A					4									2	2		
8/16/84	BKB	dstm	31	Slough 9					3							T		3	2		
8/16/84	?	dstm	32	Slough A					3					T				3	T		
8/16/84	?	dstm	33	Slough A					3									3	2		
8/16/84	?	dstm	34	Slough 11					3		T					T	T	3	T		
8/16/84	?	dstm	35	Slough 8A					3									3			
8/16/84	?	dstm	36	Slough 9A					5				T						T		
8/16/84	?	dstm	37	Slough 11					4		T							2	2		
8/16/84	?	dstm	38	Slough 11					4									2	2		
8/16/84	?	dstm	39	Slough 9A	T				5									T			
8/16/84	?	dstm	40	Slough 21	2				2		2						T	2	2		
8/16/84	?	dstm	41	Slough 21					2		2		T					2	2		
8/16/84	?	dstm	42	Slough 21					3										2		
8/16/84	?	dstm	43	Slough 21	2				3		2								T		
8/16/84	?	dstm	44	Slough 21					5										T		
8/16/84	?	dstm	45	4th July Ck.					4									3	T		
8/16/84	?	dstm	46	Slough 8A					4		T							2			
8/16/84	?	dstm	47	Slough 11					2										5		
8/16/84	?	dstm	48	Slough 8A					T								T	3	T		
8/16/84	?	dstm	49	Slough 9A					3										3		
8/16/84	?	dstm	50	Riverbank					3									3			
8/16/84	?	dstm	51	Slough 8A					T									3			
8/16/84	?	dstm	52	Slough 8A					5		T							2			
8/16/84	?	dstm	53	Slough 8A	T				4									T	2		
8/16/84	?	dstm	54	5th July Ck.					5												
8/16/84	?	dstm	56	5th July Ck.		T			2	3									3		
8/16/84	?	dstm	57	5th July Ck.					3									2	2		
8/16/84	?	dstm	58	5th July Ck.														2	4		
8/16/84	?	dstm	62	Slough 9					2									3	2		
8/16/84	BKB	dstm	61	Slough 8A					2					2				3	T		
8/16/84	?	dstm	59	Slough A					5									T	T		
8/16/84	?	dstm	63	Slough 9					5												
8/23/84	?	upstm	15	E. Fk. Watana	2	T					3									3	
8/23/84	?	upstm	16	E. Fk. Watana	3	T					3						T			3	

(continued on next page)

Table 44 (cont'd)

Date Collected	Species of bear	Place	Sample No.	Comments	1	2	3	4	5	6	9	11	12	13	14	15	16	17	18	19
SPRING SAMPLES																				
5/15/84	BRB 299	upstm	7	Susitna		2		4				T								
5/15/84	BRB 418	upstm	5	ylg w/299		5						T								
5/15/84	BRB 417	upstm	11	ylg w/299		T		3				3					T			
5/15/84	BRB 419	upstm	12	ylg w/299				5				T					T			
5/15/84	BRB 399	upstm	14	Susitna		T					3	4								
5/16/84	BRB 312	upstm	8	Stomach		T					T		5							
5/16/84	BKB 349	upstm	1	Anal plug																
5/18/84	BRB 422	upstm	9	On old moose kill		2		2				4					T			
5/27/84	BRB	upstm	10	On calf kill		T		2				5					T			
5/27/84	BRB	upstm	21	On calf kill		2		2				3					T			
5/29/84	BRB cub	upstm	3	Abandoned cub				3		2		T					T	2		
5/30/84	BRB	upstm	17	On calf kill	2							5					T			
5/31/84	BRB	upstm	2	On calf kill				4				T		2		T				
5/31/84	BRB	upstm	13	On calf kill	5	2						T					T			
5/31/84	BRB	upstm	18	On calf kill	2	2		2			3	3					T			
6/20/84	BKB	upstm	20	den of B401	3	3		2				T					T			

1. Equisetum spp. (horsetail)
8. Lichens
9. Grasses or sedges
19. Clover (Trifolium spp.)

Berries

2. Vaccinium vitis-idea (lowbush cranberry)
4. Empetrum nigrum (crowberry)
5. Oplopanax horridus (Devil's Club)
6. Arctosptaphylos alpina (bearberry)
7. Vaccinium uliginosum (blueberry)
18. Strepotpus amplexifolius (watermelon berry)
17. Other berries
    Sambucus racemosa (red elderberry)
    Oxycoccus microcarpus (bog cranberry)
    Sorbus scouplina (Greene Mt. ashberry)
    Sheperdia canadensis (soapberry) - #42
    Cornus canadensis (Cornus berry)
    Vaccinium ovalifolium (early blueberry)
    Viburnum edule (highbush cranberry)
    Ribes triste (red currant)

Animal Matter

11. Moose
12. Hare or ground squirrel, misc.
13. Feathers
14. Fish
15. Insects

16. Other Misc.

Table 45. Salmon abundance in downstream sloughs and streams, 1981-1984.

AREA	RIVER MILE	No. Adult Salmon Enumerated* 1981 (N**)	1982 (N**)	1983 (N**)	1984 (N**)
Slough 21	141.0	747 (5)	2424 (9)	1904 (13)	7197 (9)
Slough 11	135.3	5483 (9)	4806 (11)	5067 (23)	9749 (8)
Slough 8A	125.1	1283 (5)	1804 (10)	843 (20)	3054 (8)
Slough 20	140.0	27 (2)	220 (7)	201 (20)	695 (4)
Slough 9A	133.3	484 (6)	146 (3)	217 (3)	574 (5)
Moose Slough	123.5	555 (5)	115 (7)	392 (15)	405 (5)
Slough 8B	122.2	1 (1)	190 (6)	240 (6)	1749 (8)
Slough 8C	121.9	(0)	105 (3)	(0)	416 (5)
Slough 17	138.9	169 (7)	29 (4)	182 (8)	240 (4)
Slough 15	137.2	1 (1)	178 (3)	20 (5)	611 (1)
Slough B	126.3	NA	225 (6)	9 (1)	196 (5)
Slough 9	128.3	380 (5)	911 (6)	1081 (9)	499 (3)
Slough 6A	112.3	27 (3)	101 (4)	2 (1)	3 (1)
Sloughs A & A'	124.7	437 (10)	(0)	528 (16)	338 (5)
Slough 8	113.7	858 (5)	(0)	(0)	193 (6)
Slough 9B	129.2	678 (7)	(0)	(0)	181 (3)
Slough 19	139.7	84 (6)	(0)	18 (6)	147 (7)
Slough 22	144.5	NA	NA	274 (4)	199 (3)
Mainstream Zone 3	135.2	NA	NA	252 (2)	No data
Slough 2	100.2	44 (5)	0	103 (4)	287 (9)
Indian River***	138.6	232 (7)	6703 (12)	7958 (16)	14898 (9)
Lane Ck	113.6	569 (7)	2508 (11)	118 (9)	2837 (9)
4th of July Ck.	131.0	247 (6)	2832 (11)	636 (9)	6160 (7)
Little Portage Ck.	117.7	NA	407 (9)	10 (2)	384 (7)
Lower McKenzie Ck.	116.2	97 (6)	492 (6)	46 (6)	1067 (7)
5th of July Ck.	123.7	2 (1)	224 (4)	24 (4)	834 (5)
Skull Ck.	124.7	24 (3)	36 (4)	1 (1)	216 (3)
Portage Ck.	148.9	22 (1)	2238 (7)	4651 (13)	15319 (19)

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Table 45. (cont'd)

AREA	RIVER MILE	No. Adult Salmon Enumerated* 1981 (N**)	1982 (N**)	1983 (N**)	1984 (N**)
Gash Ck.	111.6	258 (2)	163 (3)	35 (2)	711 (7)
Slash Ck.	111.2	NA	6 (1)	2 (1)	8 (2)
Whiskers Ck.	101.4	212 (7)	626 (5)	273 (9)	899 (11)
Jack Long Ck.	144.5	1 (1)	54 (7)	19 (5)	27 (3)
Deadhorse Ck	120.9	0	NA	NA	378 (2)
Upper McKenzie Ck.	116.7	0	24 (2)	(0)	23 (3)
Chase Ck.	106.9	328 (8)	332 (8)	26 (5)	1523 (9)
Gold Ck.	136.7	0	37 (3)	51 (3)	83 (1)
Sherman Ck.	130.8	32 (4)	40 (4)	(0)	126 (3)

* These data sum all live and dead fish (Chinook, Sockeye, Pink, Chum, and Coho Salmon) recorded by Su-Hydro AA personnel (ADF&G) during stream surveys. Different areas were surveyed from 1 to 11 times during the year which contributes to variation observed between areas and between years in this data, survey conditions also varied. Note that the same fish would likely be recorded numerous times in replicate surveys.

** N is the number of surveys conducted where salmon were enumerated, surveys where no salmon were seen are not counted.

*** The portion of the Indian River evaluated by Fisheries personnel varied in 1981 and 1982. Most fish were found in 1982 in a tributary about ½ mile up from the mouth (Crowe, per. commun.) during our investigation of the Indian River we did not observe this location.

Table 46. Characteristics of black bear dens in the Susitna study area during winters of 1980/1981, 1981/1982, 1982/1983, 1983/84, 1984/85.

	Den No.	Bear ID No.	Age at Exit	Elevation (feet)	Slope (Degrees)	Aspect **** (True N)	Vegetation	% Canopy Tree Coverage	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm)	Previously Used? (Yes/No)	A	B	C
NATURAL CAVITIES																		
FEMALES w/offspring (at exit)																		
w/2 cubs	8	B321	11	2825	42	96	Alder	0	79	26	127	68	71	610	Yes	2	No	-
w/2 cubs	19	B328	7	1950	40	106	Alder	0	41	93	-	-	-	-	Yes	4	No	-
w/1@1	32	B328	8	2075	64	214**	Alder/Birch/Moss	50	49	39	84	54	44	180	Yes	3	No	-
w/2@0	73###	B327	8	2070	58	158	Alder	90	43	41	249	91	58	328	Yes	4	-	Yes
w/1@0	88###	B375	6	875	26	158	Alder/Birch/Spruce	85	-	-	-	-	-	-	Yes	2	-	-
w/3@0	92###	B374	7	1825	22	241	Alder/Willow	30	41	48	1220	-	-	1220	Yes	1	-	-
w/3@0	93sp.	B374	7	1775	42	92	Alder/Grass	60	33	81	-	-	36	117	Yes	-	-	-
w/2@0	113	B354	5	2650	40	307	Spruce/D. Birch/Grass	10	64	34	179	99	66	480	Yes	2	No	-
w/1@1	129	B289	13	1875	49	137	Aspen/Willow/Alder	55	55	32	327	40	64	327	Yes	2	-	Yes
w/2@1	168	B363	7	3000	-	-	-	-	-	-	-	-	-	-	-	-	-	No
w/2@1	169	B354	8	3140	27	295	Shrub/Tundra	0	38	50	172	111	69	-	Yes?	3	-	No
w/1@1	172*	B321	15	2845	47	276	Shrub/Tundra	0	-	-	-	-	-	-	-	-	No	-
2/3@0	180	B328	11	2095	57	177	Alder/Birch	0	57	54	137	54	76	229	Yes?	4	No	-
w/2@1	184	B411	10	1490	38	345	Alder/Birch	10	40	32	132	82	58	212	Yes	2	-	-
w/2@0###	158***	B289	9	1960	47	135	Alder/Birch	15	22	42	219	73	74	390	Yes	3	-	Yes
FEMALES w/o offspring (at exit)																		
	85*	B377	6	2270	47	15	Alder/Grass	10	-	-	-	-	-	-	-	-	-	-
	33	B318	7	1890	41	249	Birch	0	51	43	69	76	62	654	Yes	3	No	-
? collar shed in den	6	B325	12	1490	30	66	Birch/Alder/Spruce	50	49	27	100	74	55	113	Yes	2	No	-
	115	B348	4	3125	38	77	Shrub	20	106	33	146	73	80	475	Yes	2	-	-
	144	B376	7	2075	23	73	Alder/Grass	30	53	43	189	96	75**	433	Yes	3	-	No
	185	B405	19	1985	18	353	Alder	0	38	58	232	103	61	336	Yes	3	-	-
	191*	B375	12	1700	45	6	Alder	0	-	-	-	-	-	-	-	-	-	-

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Table 46. (continued)

	Den No.	Bear ID No.	Age at Exit	Elevation (feet)	Slope (Degrees)	Aspect*** (True N)	Vegetation	% Canopy Tree Coverage	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm)	Previously Used? (Yes/No)	A	B	C
MALES																		
	7#	B287	11	1700	46	58	Cottonwood/Willow/ Birch	50	62	44	122	89	42	-	Yes	2	No	-
	9###	B324	6	2240	30	336	Alder	0	38	34	137	70	45	-	Yes	3	No	-
	10#	B303	8	1690	50	296	Willow/Alder/Aspen	-	93	36	108	82	94	869	Yes	1	No	-
	13*	B304*	11	4340	24	300	Rock pile/Tundra	0	-	-	-	-	-	-	?*	-	No	-
	18*	B322*	5	1840	53	46	Alder/rock slide	0	-	-	-	-	-	-	?*	-	-	Yes
	###49***	B323	4	1950	-	124	Spruce/Birch	-	-	-	-	-	-	-	-	-	-	Yes
	51	B323	5	2370	30	56	Spruce/Birch	0	38	53	-	-	48	-	Yes	4	-	No
	66	B343	7	1900	60	288	Alders	40	76	86	-	-	71	488	Yes	3	No	-
	95	B360	8	2150	48	41	Birch/Spruce	40	81	38	-	64	97	465	Yes	3	-	Yes
	157	B401	4	1700	41	92	Birch/Spruce	80	51	30	134	63	71	280	Yes	2	-	Yes
	96	B346	11	2200	42	86	Alder/Birch/Spruce	40	46	48	211	185	91	318	Yes	5	-	Yes
	98	B359	5	1875	30	306	Birch/Spruce	55	58	39	216	89	51	272	Yes	3	-	Yes
	100	B358	3	3450	30	171	Alder/Tundra	0	20	53	-	-	-	-	No	5	-	No
	156	B408	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	167	B387	6	3500	39	205	Alpine tundra	0	40	56	145	106	74	421	Yes?	3	-	No
	173	B359	7	2435	43	84	Birch	60	52	49	143	69	74	283	Yes	4	No	-
UNKNOWN SEX	72	-	-	2370	30	56	Spruce/Birch	0	41	23	-	58	89	1068**	Yes	3	-	No
HOLLOW TREES																		
FEMALES (status at exit)																		
w/?@0	146	B377	6	650	0	flat	Cottonwood/Alder/Fern	90	-	36	-	89	-	-	Yes	3	-	-
w/2@1	154*	B378	8	2200	-	106	Cottonwood/Alder/Birch	-	-	-	-	-	-	-	Unk.	-	-	-
w/o	145	B402	11	625	0	flat	Cottonwood/Alder/Fern	100	63	27	80	102	-	-	Yes	2	-	-

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Table 46. (continued)

	Den No.	Bear ID No.	Age at Exit	Elevation (feet)	Slope (Degrees)	Aspect*** (True N)	Vegetation	% Canopy Tree Coverage	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm)	Previously Used? (Yes/No)	A	B	C
DUG DENS																		
FEMALES w/offspring (at exit)																		
w/2 cubs	2	B301	8	2065	34	79	Alder/Birch	90	49	43	97	92	51	151	Yes	3	-	Yes
w/3 cubs	4#	B289	10	2000	18	99	Alder/Willow/Spruce	70	39	72	142	127	55	290	No	1	-	Yes
w/2 ylgs	11	B317	8	2050	36	334	Alder	0	27	41	93	93	78	128	No	3	No	-
w/1 ylg	12	B318	6	2725	24	10	Dwarf Birch/Moss/ Tundra	0	24	42	95	84	40	145	No	5	No	-
w/2 ylgs	21##	B327	6	2000	35	267	Alder/Birch	80	22	59	163	203	116	198	?	4	-	Yes
w/2 ylgs	50	B301	9	2275	43	115	Cottonwood/Spruce	20	28	56	76	136	98	193	Yes	2	-	No
w/2@0	68*	B318	8	1975	32	248	Alder/Spruce	20	-	-	-	-	-	366	-	3	No	-
w/2@0	69	B317	10	1820	35	276	Birch	40	46	43	-	122	58	51	No	4	No	-
w/2@0	70	B301	10	2400	26	18	Alder/Birch	90	43	66	-	160	41	188	-	4	-	No
w/2@0	74*	B349	6	3250	38	133	Alder	0	-	74	-	119	43	188	No	3	-	No
w/4@0	75	B361	-	2300	21	161	Alder/Spruce	70	27	69	114	114	72	173	Yes	2	-	No
w/2@0	81	B289	12	1960	24	238	Alder	70	38	58	142	107	72	173	Yes	2	-	Yes
w/2@0	83	B370	8	1750	31	100	Alder/Birch	90	30	38	119	130	71	124	No	3	-	-
w/3@0	84	B372	10	1825	17	298	Alder/Birch/Spruce	90	36	43	76	206	60	119	No	3	-	-
w/2@0	90	B378	4	1225	34	186	Alder/Fern	90	30	79	117	147	76	185	No	2	-	-
w/3@0	91	B376	-	1425	24	39	Alder/Birch	-	38	69	84	91	74	170	Yes	3	-	-
FEMALES w/offspring (at exit)																		
w/2 @1	97*	B354	6	2375	24	267	Willows/Alder	0	33	38	-	-	-	-	No	-	-	-
w/2@0	114	B363	6	2375	13	124	Willow/Spruce/Alder	25	39	45	123	110	60	206	No	3	-	No
w/3@1	127	B361	9	1950	9	87	Spruce/Birch/Aspen	90	41	51	150	125	80	208	Yes	2	-	Yes
w/?@0	138*	B321	14	2225	5	78	D. Birch/Willow/Spruce	25	-	-	-	-	50**	232**	Unk.	5	No	-
w/2@0	141	B369	6	1300	-	-	Alder/Birch	40	-	-	-	-	-	-	Unk.	4	-	-
w/2@1	143	B405	18	1550	24	10	Alder/Birch/Spruce	95	36	59	190	127	66	190	No	4	-	-

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Table 46. (continued)

	Den No.	Bear ID No.	Age at Exit	Elevation (feet)	Slope (Degrees)	Aspect*** (True N)	Vegetation	% Canopy Tree Coverage	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm)	Previously Used? (Yes/No)	A	B	C
FEMALES w/offspring (at exit) (continued)																		
w/3@2	160*	B361	7	2440	26	218	Alder	0	-	-	-	-	-	-	No?	1	-	No
w/1@2?	174	B364	12	2145	22	214	Spruce-Birch	40	33	39	110	113	73	183	No?	2	-	Yes
w/2@0	181	B317	12	2055	32	175	Alder-Birch	20	50	59	152	133	78	152	No	3	No	-
w/3@0	186	B404	13	1975	26	45	Alder-Spruce	10	27	67	193	91	72	193	Yes	3	-	-
w/2@0	187	B402	12	1910	21	21	Alder	0	38	63	130	98	54	134	No?	3	-	-
w/2@0	188*	B377	7	1500	35	286	Alder	0	-	-	-	-	-	-	-	-	-	-
w/2@1	198*	B369	7	1100	-	-	Alder-Birch	-	-	-	-	-	-	-	-	-	-	-
w/2@0	203*	B289	14	1600	-	-	Spruce	-	-	-	-	-	-	-	-	-	-	-
FEMALES w/o offspring (at exit)																		
	34	B321	12	2125	22	72	Alder	10	29	43	99	118	79	193	No	2	No	-
	43	B317	9	2250	8	41	Dwarf Birch	0	32	36	92	89	63	150	No	2	No	-
	55	B349	5	2650	21	95	Alder/Spruce	10	39	54	56	92	55	124	No		-	No
	58	B327	7	1675	26	209	Birch/Alder	70	35	49	86	73	61	160	No	3	-	Yes
	67	B369	5	1410	21	326	Grass/Alder/Spruce	25	36	51	-	91	71	104	No	3	-	-
	80	B329	3	1725	31	276	Alder	90	24	43	102	84	53	165	No	5	-	Yes
	82	B367	5	1960	30	211	Alder/Fern	80	36	38	102	130	81	152	No	4	-	-
	99*	B363	5	2775	21	65	Alder	90	30	74	-	112**	53**	94**	No	3	-	No
	142	B411	9	1475	7	353	Alder/Birch/Spruce	100	34	57	139	117	57	220	Yes	3	-	-
MALES																		
	### 20***	B323*	3	1950	71	64	Alder/Birch/Spruce	80	166	25	217	76	36	454	Yes	3	-	Yes
	35	B304	12	1650	36	327	Birch	25	53	147	100	173	-	660	Yes	2	No	-
	38*	B343	6	1200	39	201	Birch/Alder/Spruce	60	35	62	-	-	-	-	No	?	-	-
	39	B348	10	1375	43	128	Birch/Spruce	20	57	91	116	172	183	530	Yes	1	-	-
	57	B302	10	2025	41	124	Spruce/Birch	40	55	63	94	138	101	188	Yes	2	-	Yes
	71	B365	6	900**	10**	-	Alder/Birch/Spruce	-	-	-	-	-	-	-	-			
	116*	B387	5	3375	25	359	Alder/D. Birch	80	-	40	-	-	-	-	No	4	-	No

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Table 46. (continued)

	Den No.	Bear ID No.	Age at Exit	Elevation (feet)	Slope (Degrees)	Aspect*** (True N)	Vegetation	% Canopy Tree Coverage	ENTRANCE Ht. (cm.)	ENTRANCE Width (cm.)	CHAMBER Ln. (cm.)	CHAMBER Width (cm.)	CHAMBER Ht. (cm.)	Total Length (cm)	Previously Used? (Yes/No)	A	B	C
MALES (continued)																		
	126*	B359	6	2375	0	257	Spruce/D. Birch	50	-	-	-	-	-	354**	No	2	-	No
	128	B360	9	2150	14	127	Alder/Spruce	110	54	57	90	160	84	146	No	3	-	Yes
	159	B302	13	2030	29	282	Alder	0	47	77	142	111	64	200	Yes	2	-	Yes
	202*	B416	10	1700	-	-	-	-	-	-	-	-	-	-	-	-	No	-
SPECIES UNKNOWN																		
	3	-	-	2340	35	170	Dwarf birch	0	50	54	-	-	-	170	No	-	-	No
UNKNOWN CAVITY TYPE																		
MALES																		
	40	B324	7	1400**	-	-	--	-	-	-	-	-	-	-	-	-	?	-
	51###	B346	10	2370**	30	56**	Spruce/Birch	0	38	53	-	-	48	-	Yes	-	-	No
	62	B319	4	1600**	60**	34**	Spruce/Alder	-	-	-	-	-	-	-	-	-	-	-
FEMALES																		
	65*	B329	1	1900**	45**	304**	--	-	-	-	-	-	-	Yes	-			
	63*	B290	9	1850**	15**	349**	--	-	-	-	-	-	-	-	-	-	-	No
	64*	B290	9	1700**	15**	304**	--	-	-	-	-	-	-	-	-	-	-	No
w/1@0	190*	B378	9	2000	62	196	Alder	0	-	-	-	-	-	-	-	-	-	-
UNKNOWN SEX																		
	61	?	?	2400	35**	191**	Spruce/Alder/Birch	80	-	-	-	-	-	-	No	4	-	No

(continued on next page)

Table 46. (continued)

* Actual den site not found or too difficult to enter or collapsed
** Approximate value
A Subjective characterization of quality, 1 = highest and 5 = lowest.
B Will be flooded by Devil's Canyon impoundment?
C Will be flooded by Watana impoundment?
*** Den not located first year known but thought to be the same location as subsequently found den. 158=171.
**** Mag. N+28° = True N. of hillside
# Used by the same bear two consecutive winters
Used by the offspring during natal winter and subsequent winter
Used by different radio-collared bear during subsequent winter

Dens No. 8, 19, 6, 7, 9 10, 13, 18, 2, 4, 11, 12, 21, 20, 62, 63, 64 used during winter of 1980/1981.

Dens No. 32, 33, 50, 34, 43, 55, 58, 35, 38, 39, 57, 40, 49, 51, 61, 65, 7, 9, 10, 4, 21, used during winter of 1981/1982.

Dens No. 73, 88, 92, 93, 85, 51, 66, 95, 96, 98, 100, 72, 68, 69, 70, 74, 75, 81, 83, 84, 90, 91, 97, 67, 80, 82, 99, 71, 10, 7, 9, 19 used during winter 1982/1983.

Dens No. 113, 129, 20, 115, 144, 49, 146, 154, 145, 114, 127, 138, 141, 143, 142, 116, 126, 128, 140, 152, 156, 147, 9, 51, 88, 92, and 73 used during winter 1983/84.

Dens No. 168, 169, 172, 180, 184, (158), 185, 191, 167, 173, 160, 174, 181, 186, 187, 188, 198, 203, (159), 202, 190, (85), (49), (74), used during winter 1984/85

Table 47. History of den use by individual radio-marked black bears, 1980/81 - 1983/84.

		1980/81			1981/82			1982/83			1983/84*			1984/85*
Bear No	Sex	Cavity Type	Den#	Assoc**	Cavity Type	Den#	Assoc**	Cavity Type	Den#	Assoc**	Cavity Type	Den#	Assoc**	Status
287	M	Natural	7	w/o	Natural	7	w/o	Dead----------			----------			----------
289	F	Dug	4	w/3@0	Dug	4	w/2@1	Dug	81	w/2@0	Natural	129	w/1@1	
290	F	-	63,64	w/o	Released----------									
301	F	Dug	2	w/2@0	Dug	50	w/2@1	Dug	70	w/2@0	Shed----------			Dead
302	M	Dug	57	w/o	Shed----------									
303	M	Natural	10	w/o	Natural	10	w/o	Natural	10	w/o	Dead----------			
304	M	Natural	13	w/o	Dug	35	w/o	Shed----------						
317	F	Dug	11	w/2@1	Dug	43	w/o	Dug	69	w/2@0	Natural	20	w/1@1	----------
318	F	Dug	12	w/1@1	Natural	33	w/o	Dug	68	w/2@0	Shed----------			
319	M	-	62	w/o	Dead----------									
321	F	Natural	8	w/2@0	Dug	34	w/o	Natural	7	w/o	Dug	138	w/?@0	
322	M	Natural	18	w/o	Shed & Dead----------									
323	M	Natural	20	w/o	Natural	49	w/o	Natural	51	w/o	Dead----------			
324	M	Natural	9	w/o	Dug	40	w/o	Natural	9	w/o	Natural	9	w/o	Missing----------
325	F	Natural	6	w/o	Natural	9	w/o	Shed----------						
327	F	Dug	21	w/2@1	Dug	58	w/o	Natural	73	w/2@0	Dead----------			Den #32?
328	F	Natural	19	w/2@0	Natural	32	w/1@1	Shed----------						
329	F	Dug	21	w/mom & sibling	Dug	65,21	w/o	Dug	80	w/o	Natural	73	w/1@1	Den #158***
330	M	Dug	12	w/o	Dead----------									
343	M				Dug	38	w/o	Natural	66	w/o	unk		w/o	
346	M				Natural	51	w/o	Natural	96	w/o	Natural	51	w/o	Dead----------
348	M				Dug	39	w/o	Dead----------						
349	F				Dug	55	w/o	Dug	74	w/2@0	Shed----------			Recapture Den #74?
354	F							Dug	97	w/1@1	Natural	113	w/2@0	
358	M							Natural	100	w/o	Natural	115	w/o	Dead----------
359	M							Natural	98	w/o	Dug	.126	w/o	
360	M							Natural	95	w/o	Dug	128	w/o	Shed----------
361	F							Dug	75	w/4@0	Dug	127	w/3@1	
363	F							Dug	99	w/o	Dug	114	w/2@0	
365	M							Dug	71	w/o	Dead----------			
367	F							Dug	82	w/o	Dead----------			
369	F							Dug	67	w/o	Dug	141	w/2@0	
370	F							Dug	83	W/2@0	Missing----------			
372	F							Dug	84	w/3@0	Missing----------			
374	F							Natural	92	w/3@0	Dead----------			
375	F							Natural	88	w/2@0	Natural	88	w/2@1	Natural 88 w/2@1

(continued)

Table 47. (Continued)

Bear No.	Sex	1982/83 Cavity Type	1982/83 Den#	1982/83 Assoc**	1983/84* Cavity Type	1983/84* Den#	1983/84* Assoc**	1984/85* Status
376	F	Dug	91	w/3@0	Natural	144	w/o	Den #85
377	F	Natural	85	w/o	Tree	146	w/?@0	
378	F	Dug	90	w/2@0	Tree	154	w/2@1	
379	F	Natural	19	w/3@0	Dead----------			
387	M				Dug	116	w/o	
401	M				Natural	157	w/o	Den #49
402	F				Tree	145	w/o	
404	F				Natural	92	w/o	
405	F				Dug	143	w/2@1	
406	F				Unk	140	w/2@1	
408	M				Natural	157	w/o	
409	F				Unk	152	w/o	
410	F				Dead----------			
411	F				Dug	142	w/o	
416	M							
364	F							

* most 84/85 Data are unavailable

** Associations are at time of emergence

*** Den 158 was capture site of B289 (mother of B329) in spring 1980. Den not flagged until winter 84/85, assumed was 79/80 den of B289

Table 48. History of use of individual black bear dens by radio-marked black bears, 1980/81 - 1984/85 (blanks indicate no data available, den not revisited and no radio-marked bear there).

Den No.	Den Type	Flooded	Location***	80/81	81/82	82/83	83/84	84/85
158	Dug	Yes	W	[B289 in 79/80 spring w/2@1]	Unk. 80/81, 81/82	--	--	B329 female
2	Dug	Yes	W	B301 female w/2@0	Vacant	Vacant	Vacant	
4	Dug	Yes	W	B289 female w/3@0	B289 female w/2@1	Vacant	Vacant	Vacant
6	Nat	No	D	B325 female w/o				
7	Nat	No	D	B287 male	B287 male	B321 female w/o		
8	Nat	No	D	B321 female w/2@0				
9**	Nat	No	D	B324 male	B325 female w/o	B324 male	B324 male	Vacant
10	Nat	No	D	B303 male	B303 male	B303 male	Vacant	
11	Dug	No	D	B317 female w/2@1	----------			
12	Dug	No	D	B318 female w/1@1 (B330 male)	Collapsed---------	----------		
13	Nat	No	D	B304 male				
18	Nat	Yes	W	B322 male				
19	Nat	No	D	B328 female w/2@0		B379 female w/3@0		
20	Nat	Yes	W	B323 male		----------	B317 female w/1@1	Vacant
21	Dug	Yes	W	B327 female w/B329@1	B329 female w/o	Collapsed---------	-----	
32	Nat	No	D		B328 female w/1@1	Vacant		Vacant
33	Nat	No	D		B318 female w/o			
34	Dug	No	D		B321 female w/o			
35	Dug	No	D		B304 male	Vacant----------		
38	Dug	No	DS		B343 male	Collapsed---------	----------	
39	Dug	No	DS		B348 male	Vacant		
40	-	Yes	D		B324 male			
43	Dug	No	D		B317 female w/o			
49	Nat	Yes	W		B323 male(?)			B401 male
51*	Nat	No	W		B346 male	B323 male	B346 male	
50	Dug	No	W		B301 female w/2@1	Vacant	Vacant	
55	Dug	No	W		B349 female w/o			
57	Dug	Yes	W		B302 male	Vacant	Vacant	Vacant
58	Dug	Yes	W		B327 female w/o	Vacant		
61	Dug	No	W	-	Unmarked BKB			
62	-	No	D	B319 male				
63	-	No	D	B390 female w/o				
64	-	No	D	B390 female w/o				
65	-	Yes	W		B329 female w/o			
66	Nat	No	D			B343 male		
67	Dug	No	DS			B369 female w/o	-------	
68	Dug	No	D			B318 female w/2@0	Collapsed----	
69	Dug	No	D			B317 female w/2@0		
70	Dug	No	W			B301 female w/2@0	Vacant	Vacant
71	Dug	No	DS			B365 male		

(Continued on next page)

Table 48. (Continued)

Den No.	Den Type	Flooded	Location***	80/81-81/82	82/83	83/84	84/85
72	Nat	No	W		Unmarked BKB		
73	Nat	Yes	W		B327 female w/2@0	B329 Female w/1@1	Vacant
74	Dug	No	W		B349 female w/2@0		B349?
75	Dug	No	W		B361 female w/4@0		
80	Dug	Yes	W		B329 female w/o		
81	Dug	Yes	W		B389 female w/2@0	Vacant	
82	Dug	No	DS		B367 female w/o		
83	Dug	No	DS		B370 female w/2@0		
84	Dug	No	DS		B372 female w/3@0		
85	Nat	No	DS		B377 female w/o		B376?
88	Nat	No	DS		B375 female w/2@0	B375 female w/2@1	
90	Dug	No	DS		B378 female w/2@0		
91	Dug	No	DS		B376 female w/3@0		
92	Nat	No	DS		B374 female w/3@0	B404 female w/o	
93 spring	Nat	No	DS		B374 female w/3@0		
95	Nat	Yes	W		B360 male	Vacant	
96	Nat	Yes	W		B346 male		
97	Dug	No	W		B354 female w/1@1	Collapsed----------	
98	Nat	Yes	W		B359 male	Vacant	Vacant
99	Dug	No	W		B363 female w/o	Collapsed----------	
100	Nat	No	W		B358 male	Collapsed----------	
113	Nat	No	W			B354 female w/2@0	
114	Dug	No	W			B363 female w/2@0	Vacant
115	Nat	No	W			B358 female w/o	
116	Dug	No	W			B387 male	Collapsed----------
126	Dug	No	W			B359 male	Collapsed----------
127	Dug	Yes	W			B361 female w/3@1	Vacant
128	Dug	Yes	W			B360 male	
129	Nat	Yes	W			B289 female w/1@1	Vacant
157	Nat	Yes	W			B401 male	
138	Dug	No	D			B321 female w/?@0	Collapsed----------
140	-	No	DS			B406 female w/2@1	
141	Dug	No	DS			B369 female w/2@0	
142	Dug	No	DS			B411 female w/o	
143	Dug	No	DS			B405 female w/2@1	
144	Nat	No	DS			B376 female w/o	
145	Tree	No	DS			B402 female w/o	Vacant

(continued on next page)

Table 48. (Continued)

Den No.	Den Type	Flooded	Location***	80/81 - 82/83	83/84	84/85
146	Tree	No	DS		B377 female w/?@0	Vacant
147	-	-	D		B343 male	
152	-	No	DS		B409 female w/o	
154	Tree	No	DS		B378 female w/2@1	
156	Nat	No	DS		B408 male	

* Attempted initial denning location for B323, B346, & B360 in 1982/1983. B346 & B360 subsequently moved.
** Attempted denning location for B324 & B325 in 1981/1982. B324 subsequently moved.
*** W= Watana, D= Devils Canyon, DS= Downstream of impoundment zone.

SUMMARY OF TABLE:
103 dens identified to date throughout entire study area (reused dens counted only once).
51(49.5%) dug dens, 40(38.8%) natural cavity dens, 9(8.7%) unknown cavity type. 3(2.9%) tree dens.

Watana dens (N=44)		Devils Canyon dens (N=30)		Downstream dens (N=29)	
				Tree	3(10.3%)
Dug	24(54.5%)	Dug	10(33.3%)	Dug	17(58.6%)
Natural	18(40.9%)	Natural	13(43.3%)	Natural	9(31.0%)
Unknown	2(4.5%)	Unknown	7(23.3%)		
Flooded	24(54.5%)	Flooded	1(3.3%)	Flooded	0(0.0%)
Not flooded	20(45.5%)	Not flooded	28(93.3%)	Not flooded	29(100.0%)
		Unknown	1(3.3%)		

Table 49. Black bear den entrance and emergence dates, winter of 1983/84.

Bear ID	Sex	1983 Entrance			1984 Emergence			Days in Den		
		earliest	latest	Mid.	earliest	latest	Mid.	Min.	Max.	Mid.
B289	F	5 Oct	24 Oct	10 Oct	30 Apr	10 May	5 May	189	218	208
B317	F	26 Sep	5 Oct	1 Oct	30 Apr	10 May	5 May	208	227	217
B321	F	26 Sep	5 Oct	1 Oct	10 May	16 May	13 May	218	233	225
B324	M	15 Sep	27 Sep	21 Sep	30 Apr	10 May	5 May	216	238	227
B329	M	5 Oct	24 Oct	15 Oct	18 Apr	30 Apr	24 Apr	177	208	192
B343	F	5 Oct	24 Oct	15 Oct	24 Apr	30 Apr	27 Apr	183	208	195
B346	M	16 Sep	27 Sep	22 Sep	18 Apr	10 May	29 Apr	204	237	220
B354	F	27 Sep	5 Oct	1 Oct	10 May	15 May	13 May	218	231	225
B358	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	203
B359	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	203
B360	F	5 Oct	24 Oct	15 Oct	7 Apr	18 Apr	13 Apr	166	196	181
B361	F	5 Oct	24 Oct	15 Oct	18 Apr	30 Apr	24 Apr	177	208	192
B363	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	203
B369	F	5 Oct	24 Oct	15 Oct	10 May	23 May	17 May	199	231	215
B375	M	26 Sep	5 Oct	1 Oct	18 Apr	30 Apr	24 Apr	196	217	206
B376	M	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	189	218	203
B377	F	15 Sep	26 Sep	21 Sep	10 May	23 May	17 May	240	251	239
B378	F	5 Oct	24 Oct	15 Oct	30 Apr	10 May	5 May	188	218	203
B387	M	5 Oct	25 Oct	15 Oct	30 Apr	10 May	5 May	189	218	203
B401	F	5 Oct	24 Oct	15 Oct	7 Apr	18 Apr	13 Apr	166	196	181
B402	F	26 Sep	5 Oct	1 Oct	30 Apr	10 May	5 May	208	224	217
B404	F	26 Sep	5 Oct	1 Oct	10 May	23 May	17 May	218	240	229
B405	F	5 Oct	24 Oct	15 Oct	10 May	23 May	17 May	199	231	215
B406	F	5 Oct	25 Oct	15 Oct	18 Apr	30 Apr	24 Apr	176	208	192
B408	M	5 Oct	25 Oct	15 Oct	30 Apr	10 May	5 May	188	218	203
B409	F	26 Sep	5 Oct	1 Oct	10 May	23 May	17 May	218	240	229
B411	F	5 Oct	24 Oct	15 Oct	10 May	23 May	17 May	199	231	215
	Mean	2 Oct	16 Oct	8 Oct	29 Apr	10 May	4 May	196	222	209
	"S"	6.6	10.6	8.3	9.9	9.9	9.9	17.7	13.5	14.9
	n	27	27	27	27	27	27	27	27	27

Table 50. Black bear den entrance and emergence dates, winter of 1984/85.

Bear ID	Sex	1984 Entrance			1985 Emergence			Days in Den		
		earliest	latest	Mid.	earliest	latest	Mid.	Min.	Max.	Mid.
B289	F	1 Oct	11 Oct	6 Oct						
B317	F	1 Oct	11 Oct	6 Oct						
B321	F	1 Oct	11 Oct	6 Oct						
B329	M	11 Oct	24 Oct	18 Oct						
B343	M	1 Oct	11 Oct	6 Oct						
B354	F	1 Oct	11 Oct	6 Oct						
B359	M	1 Oct	11 Oct	6 Oct						
B361	F	11 Oct	24 Oct	18 Oct						
B363	F	1 Oct	11 Oct	6 Oct						
B369	F	11 Oct	24 Oct	18 Oct						
B375	F	11 Oct	24 Oct	18 Oct						
B376	F	11 Oct	24 Oct	18 Oct						
B377	F	1 Oct	11 Oct	6 Oct						
B378	F	21 Sep	1 Oct	26 Sep						
B387	M	1 Oct	11 Oct	6 Oct						
B401	M	1 Oct	24 Oct	13 Oct						
B402	F	24 Oct	7 Nov	31 Oct						
B404	F	11 Oct	24 Oct	18 Oct						
B405	F	21 Sep	1 Oct	26 Sep						
B406	F	21 Sep	Missing	---						
B408	M	11 Oct	24 Oct	18 Oct						
B409	F	11 Oct	24 Oct	18 Oct						
B411	F	1 Oct	11 Oct	6 Oct						
B328	F	6 Sep	21 Sep	14 Sep						
B349	F	1 Oct	11 Oct	6 Oct						
B364	F	21 Sep	1 Oct	26 Sep						
B416	M	21 Sep	1 Oct	26 Sep						
B302	M	1 Oct	24 Oct	13 Oct						
	Mean	3 Oct	15 Oct	9 Oct						
	"S"	9.5	10.5	9.9						
	n	28	27	27						

Table 51. Number of observations and percent (in parenthesis) of radio-marked black bears within nestled impoundment proximity zones of the Watana impoundment (den-related activities are not included).

TIME PERIOD	ZONE 1 (impoundment)		ZONE 2 (shore-1 mile)		ZONE 3 (1-5 miles)		ZONE 4 (over 5 miles)		TOTAL
1. April 1-30	6	(100)	0		0		0		6
2. May 1-15	31	(44)	31	(44)	8	(11)	0		70
3. May 16-31	84	(55)	55	(36)	13	(9)	0		152
4. June 1-15	142	(55)	69	(27)	43	(17)	6	(2)	260
5. June 16-30	74	(36)	79	(39)	49	(24)	3	(1)	205
6. July 1-15	25	(32)	30	(38)	23	(29)	1	(1)	79
7. July 16-31	50	(40)	46	(37)	28	(23)	0		124
8. August 1-15	40	(39)	41	(40)	22	(21)	0		103
9. August 16-31	37	(30)	44	(36)	40	(33)	2	(2)	123
10. Sept. 1-15	24	(29)	34	(41)	23	(28)	2	(2)	83
11. Sept. 16-March 31	38	(38)	40	(40)	22	(22)	0		100
TOTALS	551	(42)	469	(36)	271	(21)	14	(1)	1305
Area within zone (km^2)	159.32		327.07		1233.51		--		1719.00
%	9.29		19.02		71.72		--		100.0

Value of Chi Square test of the null hypothesis that the use of each zone is equivalent to expected values based on the area of each zone for:

	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
All months, 3 zones	551	119.6	469	245.6	271	926.0	2,222**	2
All months, zones 1 & 2 only	551	334.1	469	685.9	--	--	210**	1

* reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 52. Number of observations and percent (in parenthesis) of radio-marked black bears within nestled impoundment proximity zones of the Devil's Canyon impoundment (den-related activities are not included).

TIME PERIOD	ZONE 1 (impoundment)	ZONE 2 (shore-1 mile)	ZONE 3 (1-5 miles)	ZONE 4 (over 5 miles)	TOTAL
1. April 1-30	0	1	0	0	1
2. May 1-15	2	33	16	2	53
3. May 16-31	2	43	43	0	88
4. June 1-15	8	70	86	0	164
5. June 16-30	3	45	75	2	125
6. July 1-15	0	21	29	1	51
7. July 16-31	0	13	33	1	47
8. August 1-15	0	17	17	2	36
9. August 16-31	2	18	26	2	48
10. Sept. 1-15	1	13	13	3	30
11. Sept. 16-March 31	0	18	16	2	36
TOTALS	18 (3)	292 (43)	354 (52)	15 (2)	679
Area within zone (km^2)	28.92	164.78	689.01	--	882.71
%	3.28	18.67	78.06	--	100.0

Value of Chi Square test of the null hypothesis that the use of each zone is equivalent to expected values based on the area of each zone for:

	ZONE 1 obs.	ZONE 1 E(x)	ZONE 2 obs.	ZONE 2 E(x)	ZONE 3 obs.	ZONE 3 E(x)	X^2	d.f.
All months, 3 zones	18	21.8	292	124.0	354	518.3	275**	2
May 1-June 30 3 zones	12	9.9	146	56.6	145	236.5	177**	2
May 1-June 30 2 zones	12	23.6	146	134.4	--	--	6.7**	1

* _ reject null hypothesis, p less than 0.10

** reject null hypothesis, p less than 0.05

Table 53. Results of intensive monitoring of black bear predation rates during spring 1984. Bears were monitored twice/day from 5/29-6/7 and once/day from 6/8-7/1, conditions permitting. When two bears were on a kill each was credited with half of the kill unless the bear that made the kill was known.

Bear ID	Sex	Age	Repro. status	Obsv. period	No. of locations	No. of visuals	% visuals	No. calf moose kills	No. non-calf/ moose kills	No. species/ age unknown kills	No. of suspected kills	Total known/suspected kills
MALES												
401	M	4	--	5/28-7/1	38	24	63	0	0	0	0	0
387	M	5	--	5/28-7/1	38	36	95	1	0	0	0	1
359	M	6	--	5/28-7/2	40	33	83	1	0	0	0	1
302	M	12	--	5/29-7/1 less 6/10-6/21	27	22	81	3	0	0	0	3
416	M	A	--	5/28-7/1	39	36	92	0	0	0	0	0
Misc. male* 324			--	--	3	3	100	0	0	0	0	0
ALL MALES					185	154	83	5	0	0	0	5
FEMALES												
329	F	4	estrus	5/28-7/1	42	32	76	1	0	0	0	1
358	F	4	estrus	5/28-7/1	32	23	72	1	0	0	0	1
349	F	7	estrus	5/28-7/1	40	29	73	0	0	0	0	0
328	F	10	estrus	5/28-7/1	41	32	78	0	0	0	0	0
364	F	11	estrus	5/28-7/1	41	38	93	1	0	0	1	2
361	F	9	w/3@1	5/28-7/1	38	31	82	0	0	0	0	0
317	F	11	w/1@1	5/28-7/1	41	33	80	0	0	0	0	0
289	F	13	w/1@1	5/28-7/1	43	36	84	0	0	0	0	0
Misc. Females* 321, 354, 363			--	--	22	17	77	0	0	0	0	0
ALL FEMALES					340	271	80	3	0	0	1	4
ALL BLACK BEARS					525	425	81	8	0	0	1	9

SUMMARY

Category	Number of known kills/100 visuals	Number of known or suspected kills/100 visuals	Number of known moose calf kills/100 visuals
All males	3.3	3.3	3.3
All females	1.1	1.5	1.5
ALL BLACK BEARS	1.9	2.1	2.1

* These individuals were not monitored intensively during this period

Table 54. Results of intensive monitoring of black bear predation rates during summer 1984. Bears were monitored once/day from 23 July through 1 August, conditions permitting.

Bear ID	Sex	Age	Repro. status	Obsv. period	No. of locations	No. of visuals	% visuals	Total known/suspected kills of ungulates *
MALES								
302	M	12	--	7/23-7/30	6	5	83.3	0
358	M	4	--	7/23-7/30	6	3	50.0	0
359	M	6	--	7/23-7/30	6	4	66.7	0
387	M	5	--	7/23-7/30	4	1	25.0	0
401	M	4	--	7/23-7/30	6	4	66.7	0
416	M	A	--	7/23-7/30	6	5	84.3	0
	Subtotal for males				34	22	64.7	0
FEMALES								
289	F	13	w/1@1	7/23-7/30	6	5	83.3	0
317	F	11	w/1@1	7/23-8/1	6	3	50.0	0
328	F	10	alone	7/23-7/30	6	5	83.3	0
329	F	4	alone	7/23-7/30	6	4	83.3	0
349	F	7	alone	7/23-7/30	6	5	83.3	0
361	F	9	w/3@1	7/23-7/30	6	6	100.0	0
364	F	8	alone	7/23-7/30	6	3	50.0	0
321	F	14	alone	7/23-8/1	3	2	67.7	0
354	F	7	w/2@0	7/24 & 8/1	2	2		0
363	F	6	w/2@0	7/24 & 8/1	2	2		0
	Subtotal for females				49	37	77.6	0
	TOTALS for all black bears				83	59	72.3	0

* Note that if the same ratio of kills to visuals observed in the spring (8:425) were present in the summer, then only 1.1 kills would have been expected to be found during the 59 summer visuals.