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Cumulative effects model verification, sustained yield estimation, and population viability management of the Kenai Peninsula, Alaska brown bear

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Final Research Performance Report
1 July 1995–30 June 2000
Federal Aid in Wildlife Restoration
Grants **W-24-4 to** W-27-3, Study 4.27

FEDERAL AID
FINAL RESEARCH PERFORMANCE REPORT 4.27

PROJECT TITLE: Cumulative effects model verification, sustained yield estimation, and population viability management of the Kenai Peninsula, Alaska brown bear

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COOPERATORS: Kenai National Wildlife Refuge, United States Fish and Wildllife Service, U.S. Dept. of Interior; Chugach National Forest, U. S. Forest Service, U.S. Department of Agriculture; Kenai Fjords National Park, National Park Service, U.S. Department of Interior

GRANTS AND SEGMENT NRS.: W-24-4–W-24-5 and W-27-1–W-27-3
SEGMENT PERIODS: 1 July 1995–30 June 2000

WORK LOCATION: Kenai Peninsula
STATE: Alaska

I. PROGRESS ON PROJECT OBJECTIVES

Objective 1. Evaluate a cumulative effects model developed by the Interagency Brown Bear Study Team. This objective requires the collection of large numbers of bear locations in identifiable habitat types. Thus, the first step for the project was to test the efficacy of PTT versus GPS-SOB radio collars. Through 1998 a mix of both collar types were deployed with variable success, however in 1999 we suffered a catastrophic failure of roughly 75% collars. Cumulative effects model evaluation will require many more bear locations than collected to date, so model testing has not yet begun.

Objective 2. Identify critical components of brown bear habitat and movement corridors between these habitats. Bear location data continues to be collected. In addition, critical measures of bear body composition over time have been gathered showing where and when bears first begin to deposit critical fat stores for winter hibernation, as well as food sources.

Objective 3. Estimate the survival rates of radio-collared female brown bears relative to human caused mortality. Survivorship of adult female brown bears was calculated to be 0.9286 (CI = 0.7937–1.0635; n = 14), 0 .9355,(CI = 0.849–1.022; n = 31) and 0.9048 (CI = 0.816-0.9935; n = 42), and 0.875 (CI = 0.7725–0.9775; n = 40) for 1995, 1996, 1997 and 1998, respectively. Additional survivorship data were collected during the 1999 season during telemetry flights tracking radiocollared animals.

Objective 4. Model the brown bear population to establish sustainable yield and assess population viability with the ultimate goal of developing a brown bear management plan. Survivorship of cubs of the year (COY) and yearlings were calculated for each year of the study. Data were collected from observations of litter size and reproductive success (i.e., cub disappearance over the summer) recorded

from telemetry flights of radiocollared bears. This table summarizes the survivorship data through the 1997 field season:

Survivorship of brown bear offspring on the Kenai Peninsula, Alaska.

Year	COY	95% CI	Yearlings	95% CI
1995	1.0000 (3)[a]	1.0000–1.0000	0.4000 (10)	0.0964–0.7036
1996	0.7500 (36)	0.6085–0.8915	0.3333 (9)	0.0253–0.6413
1997	0.7317 (41)	0.5961–0.8673	0.7000 (30)	0.5360–0.8640
1998	0.7917 (24)	0.6292–0.9541	0.5313 (32)	0.3583–0.7042

[a] Number of individuals at start of year

Objective 5. Prepare a final report. This is the required final report.

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD Job 1. Evaluate a cumulative effects model developed by the Interagency Brown Bear Study Team. Twelve (12) GPS-SOB collars were deployed on 12 animals during the 1999 field season. Virtually all collars failed soon afterwards, and troubleshooting by the company pinpointed a faulty solder joint as the cause. Few location data were collected during this time, and because this was the final year for this project, the testing of the cumulative effects model has been rolled over into a new project (4.29).

Job 2. Identify critical components of brown bear habitat and movement corridors between these habitats. The vegetation map needed for identifying bear habitats became available late in the year. Preliminary work was begun relating bear location data to physical characteristics from the map and from satellite imagery. Resource selection function parameters were used to classify areas of the Kenai Peninsula for their probability of use by bears; maps produced are included in the appended Conservation Assessment (appendices mailed separately because of size). In addition to these GIS exercises, a student completed his PhD relating seasonal variation of bear body composition to diet, as determined from stable isotope analyses. This work has produced several publications in peer-reviewed journals, and reprint copies may be found in Appendix B.

Job 3. Estimate the survival rates of radiocollared female brown bears relative to human-caused mortality. The draft of a manuscript that explores the dynamics of DLP kills is included in appendix C. This manuscript is in draft form and should not be cited at this time. The survivorship of radiocollared females was calculated for each year of the study and is included in the following table:

Survivorship of adult female brown bears on the Kenai Peninsula, Alaska.

	Survivorship	
Year	Adult Females	95% CI
1995	0.9286 (14)[a]	0.7937–1.0635
1996	0.9355 (31)	0.8490–1.0220
1997	0.9048 (42)	0.8160–0.9935
1998	0.8750 (40)	0.7725–0.9775
1999	0.9032 (31)	0.7991–1.0073

[a] Number of individuals at beginning of year

Job 4. Model the brown bear population to establish sustainable yield and assess population viability with the ultimate goal of developing a brown bear management plan. Though the radio GPS-SOB collars failed, additional population demographic data were collected from radiotelemetry flights conducted over the summer of 1999. Survivorship of COY and Yearlings for the entire study are shown in the following table.

Survivorship of brown bear offspring on the Kenai Peninsula, Alaska.

Year	**COY**	**95% CI**	**Yearlings**	**95% CI**
1995	1.0000 (3)[a]	1.0000–1.0000	0.4000 (10)	0.0964–0.7036
1996	0.7500 (36)	0.6085–0.8915	0.3333 (9)	0.0253–0.6413
1997	0.7317 (41)	0.5961–0.8673	0.7000 (30)	0.5360–0.8640
1998	0.7917 (24)	0.6292–0.9541	0.5313 (32)	0.3583–0.7042
1999	0.6000 (15)	0.3521–0.8479	0.6667 (15)	0.4281–0.9052

[a] Number of individuals at start of year

Job 5. Prepare a final report. This is the final report.

III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD: There was none.

IV. FEDERAL AID TOTAL PROJECT COSTS FOR THIS SEGMENT PERIOD

$ 55,000.00

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