

Bear Activity and Habitat Assessment Project 2004 Progress Report

**Tania Lewis and Steve Partridge
October 2004**

Background

In Glacier Bay National Park encounters between kayakers and black and brown bears are of great concern, both because of potential threat to human safety as well as potential displacement of bears from important seasonal habitats. Little is known about the black and brown bears in GLBA, and as a result it has been difficult to evaluate seasonally important habitats in relation to their importance to bears. In order to evaluate current camping closure areas as well as potentially important foraging areas within the park, managers need information regarding how bears use specific sites.



Brown bear in Tidal Inlet

The purpose of this project is to assess the quality of bear habitat and bear activity patterns in eight areas of management concern in Glacier Bay. This project is an outgrowth of previous work designed as a broad scale survey of bear habitat relationships and assessment of risk factors for human/bear encounters at various campsites throughout the bay (Smith et al. in press). In that project, two-person crews kayaked along Glacier

Bay's beaches in the summers of 2001 and 2002, visiting campsites and assessing their risk factors for bear encounters. Researchers surveyed 120 beaches for signs of bear use and conducted risk assessments at 162 campsites. At each site they recorded bear sign and bear habitat potential along with other site characteristics thought to be predictive of the likelihood of a bear encounter.



A female black bear with three cubs feeds on a humpback whale carcass on Strawberry Island.

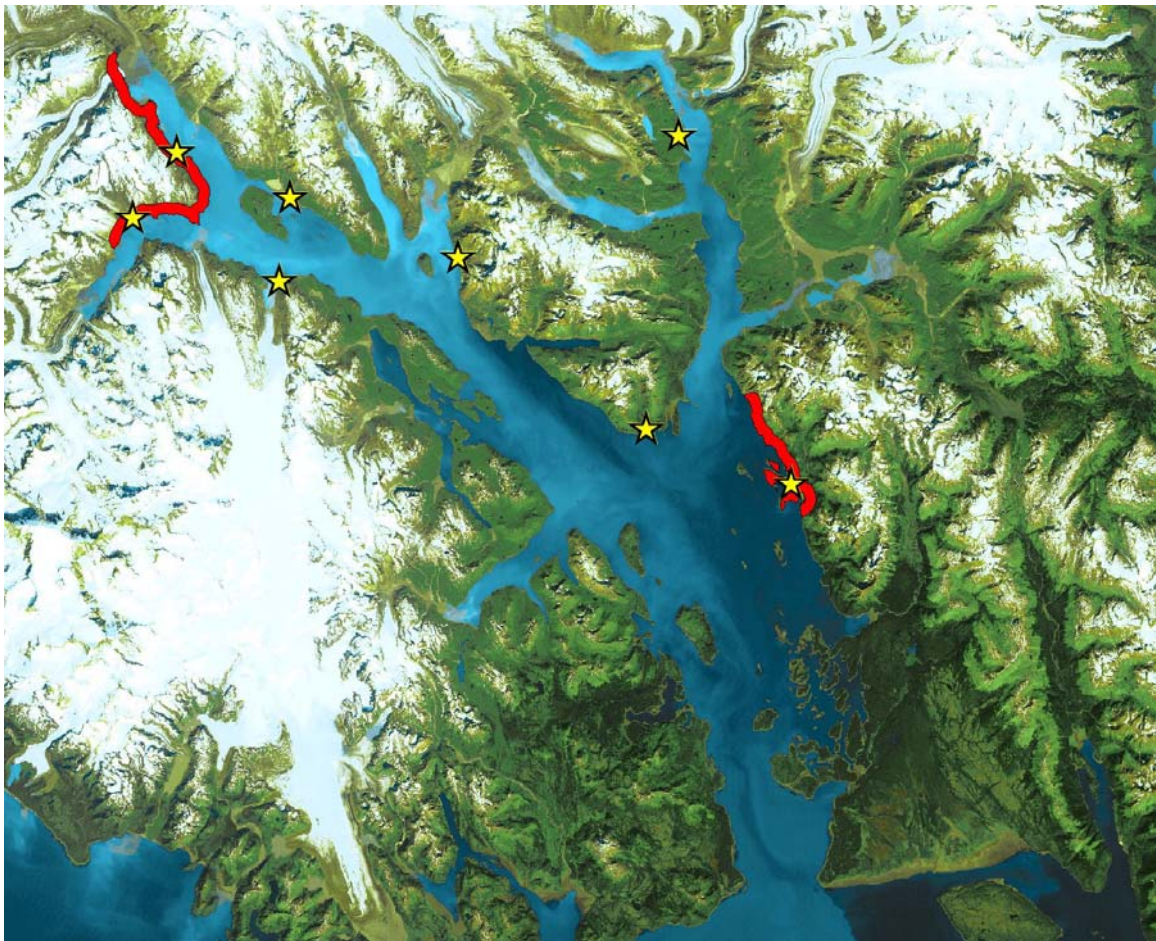
The current project will collect finer scale data documenting bear activity and habitat characteristics at sites of high concern identified in the previous research project. Results of the current project will provide important input to the bear management and backcountry management plans for Glacier Bay National Park. Specifically this research will help GLBA managers by providing the following information:

1. daily and seasonal activity patterns of brown and black bears at selected sites
2. an assessment of the use of habitat and terrain factors to estimate seasonal bear activity rates
3. a seasonal nutritional profile for bears using selected sites using stable isotope and scat analysis
4. a minimum number of bears using selected sites as well as distribution of black and brown bears within these sites using DNA techniques
5. an evaluation of current closure areas (Tarr Inlet and Sandy Cove) in relation to other selected sites with regard their bear habitat and activity potential
6. an independent assessment of the use of local habitat features to estimate bear

encounter potential (current work of Smith et al)

7. a profile of nutritionally important bear food items throughout the season through habitat mapping and plant nutritional analysis

Three of the eight study areas for this project are within the Tarr Inlet and Sandy Cove bear camping closure areas. These “temporary” closures were instituted in the 1980’s after repeated bear-human conflicts in both locations that included one human fatality (Sandy Cove in 1980). These areas are closed to camping during the summer months when human use and bear numbers are highest. Until the present study, little has been known about bear habitat and activity in these closure areas. The other five of the eight study areas are beaches of high bear use, high numbers of bear-camper conflicts, and/or where a conflict of bear food resources and human use is suspected. As with the camping closures, information from this study will help managers decide how to best protect campers and bears in these areas of high use and concern.



Study area locations marked with yellow stars and current bear camping closure areas highlighted in red (Tarr Inlet closure on the left and Sandy Cove on the right)

Methods

Bear Activity

Bear activity is assessed using three different methods: remote time-lapse photography, scented bear hair traps, and bear sign surveys.

Sony video cameras are tucked into shrubs on rock knolls above each study site. A marine battery and solar panel keep the camera running through the summer and a small electric fence protects the equipment from bears. The cameras are preset to film $\frac{1}{2}$ second of tape (about 12 frames) every minute. This film will be analyzed to determine a general index of overall bear activity by comparing the number of frames containing bears with the number of frames with no bears present.



Video camera and solar panel set up in Reid Inlet.

Each study site also contains at least one bear hair trap, which is a triangle of knee-high barbed wire strung around a pile of sticks or rocks on which a steamy quart of rancid cow's blood and fish oil is poured each visit. Bears are lured into the traps by the enticing scent and hopefully leave clumps of fur on the barbs, which can be genetically analyzed for species, sex, and individual identification. Results for this analysis will indicate how many different bears have used the area between our visits. Hair traps are placed far off the beach and in thick scrub where people are unlikely to be walking. Bear hair is also collected opportunistically from rub trees, trails and beds.



Deploying bear attractant scent at a hair trap in Tarr Inlet.

Bear sign surveys consist of researchers spreading out and combing the beach meadows, searching for bear sign and recording it with a GPS unit and on aerial photographs. Bear sign includes scat, trails, rub trees, beds, digs and signs of grazing. The amount of “repeat-use” sign such as trails and rub trees, and the number of “single-use” sign such as scat, will be calculated as a measure of bear activity in the area seasonally.

Bear Habitat

Bear habitat quality is measured using vegetation plots, analysis of bear scat, nutritional analysis of plant samples, and stable isotopic analysis of bear foods and bear hair.

In each study area, we delineate the boundaries of different habitat zones, and then run transects through each zone on which we randomly place a small square to determine our plot. In each plot we estimate the percent cover of each plant species and count the number of berries on berry producing plants. Data from these plots gives us an average percent cover of each plant in the area and an overall characterization of the habitat zone.



Vegetation plot along a transect line in a “mixed herb” habitat zone.

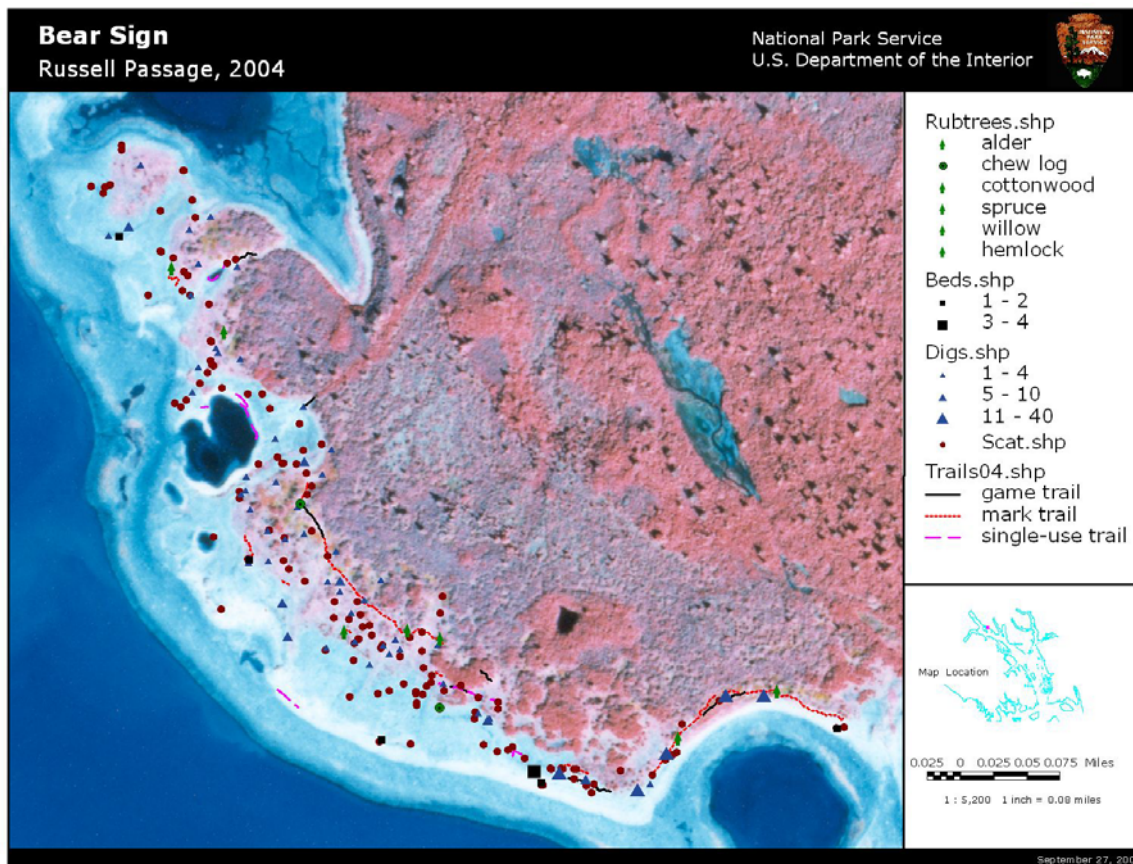
In order to find out what foods bear are targeting, we examine each scat we find for contents. Scats that are too complex to examine in the field are collected and later sieved for more detailed analysis. In order to determine the relative importance of each plant species to bears, plants that are observed or known to be bear foods are collected from each study area for nutritional analysis. Other bear foods such as barnacles, mussels, and spawning salmon are also collected opportunistically. A number of these bear food samples will also be sent off for stable isotope analysis to determine the carbon and nitrogen signature of each food source. This can be compared to stable isotope analysis of bear hair to determine the percentage of marine versus terrestrial foods that bears in each study area are consuming.



Examining the contents of bear scat (otherwise known as “poking the poop”).

Results

In the summer of 2004, we completed our first field season of data collection. We visited each of the eight study areas once every 14 days from June 2 to Sept. 10th for a total of 45 field days on eight trips. We collected 50 video tapes of time-lapse photography covering about 54 days at each camera site. We collected 528 bear hair samples from hair traps, rub trees, bear beds and trails. We examined a total of 400 scats for contents, of which we collected 194 for more detailed analysis. We recorded GPS positions for 141 sections of bear trails, 47 rub trees, 56 beds, and 348 digs. We determined the contents of 1090 vegetation plots in 61 different habitat zones. We collected 87 plant samples for nutritional and stable isotope analysis.



GIS spatial data of bear sign overlaid on an aerial photo of study area in Russell Passage.

Discussion

It was a fantastic summer for seeds and berries in Glacier Bay, and this was reflected in the scats of bears throughout the Bay. Strawberry and soapberry were heavily targeted in the upper Bay while strawberry, salmon berry and devil's club berry were big hits in Sandy Cove. We were surprised to see the large amount of flowers and seed heads of *Oxytropis campestris*, both grazed and in scat. In past studies we have observed bears' use of the root and occasional foraging of seed heads, but this year we noted the seed heads in numerous scats and in certain meadows the grazing was so intense that the plants looked like they had been mowed.



Grazed *Oxytropis* flowers in Queen Inlet.

Another surprising food we saw targeted was wasp nests. Around mid-summer we began discovering the remains of wasp nests in the ground at the base of bushes. At the same time we began seeing wasp heads and abdomens in the scat. We also found wasp nests hanging from alders and cottonwoods. One particularly large nest we found in the most painful way at Wolf Point was later seen demolished, as if batted like a piñata.



Remains of wasp nest in Russell Passage.

We also saw bumble bee parts in many scats in smaller quantities. We found hair and body parts of what we suspect to be bear, in scats in two different locations. Otherwise it looked as if bears were eating the usual assortment of berries, grasses, herbs, and barnacles. The pink salmon runs seemed late and small: streams that we have seen teeming with pink salmon in July of past years had only a few fish by the end of August this year. We found only a handful of scavenged fish and scats containing fish parts in all our study areas.

Despite the fact that we were surveying some of the “beariest” beaches of Glacier Bay, we saw only eight brown bears and 13 black bears over the entire summer. Because this is the first year of this study, we have nothing to compare these numbers too, but they seem low. We certainly saw a lot of bear sign and evidence that bears had been at each of our study sites almost every time we visited. Perhaps the dry hot weather kept bears off the beaches during the day, or it is possible that the bumper crop of berries allowed bears to forage farther inland. To look for possible trends in bear numbers, we will examine the number of bear sightings recorded from the interpretive rangers on the daily tour boat over past years and during this study.



Two black bears interact in South Sandy Cove.

Preliminary analysis of data from 2004 will occur this winter. The summer of 2005 will be the second and final season of field work, after which the data will be analyzed and a final report to the Park will be written.

Many thanks to Justin Smith, boat captain extraordinaire; to Allison Banks, Susan Boudreau, and Rusty Yerxa for logistical support; to Tom Smith for long distance support and advisement; and to Jim Wilder, Michelle Sebern, and Phoebe Vanselow for valued field assistance.

See you next year!



2004 bear crew: Tania Lewis, Jessica Speed, Steve Partridge, and Nat Drumheller.
Contact: Tania_Lewis@nps.gov, (907) 697-2668