Research Season Summary Report | 2014

SpiritBEAR RESEARCH FOUNDATION

Prepared by:

Christina Service, Rosie Child & Chris Darimont

With contributions from:

Hakai

RAINCOAST CONSERVATION FOUNDATION

Applied Conservation Science Lab

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Gratitude

The 2014 research season was a tremendous success due to the remarkable support from community members, private donors, and partners. We are grateful to David Vernon, Kitasoo Forestry Corporation, The Nature Conservancy, Tides Canada and the Tula Foundation for their on-going support, and to our collaborators: Kitasoo/Xai'xais Nation, Raincoast Conservation Foundation, and the University of Victoria Hakai – Raincoast Applied Conservation Science lab.

Thanks also to the photographers who contributed to this report:

- Andrew S. Wright- Flying eagle (pg.4), landscapes (pg.9)
- Cael Cook- Spirit bear (pg.8)
- Douglas Neasloss- Watchman pole (p.14), landscape (pg.16), Klemtu (pg.17), bears (pg.9 & 11)
- Kyle Breckenridge- Cover photo
- Philip Charles- Grizzly bear (pg.4)
- Rosie Child- Researchers (pg.1 & 8), landscapes (pg.2, 15, 16)
- Tavish Campbell- Salmon (pg.12)

Spirit Bear Research Foundation is a collaboration between the Kitasoo/ Xai'xais First Nation and conservation scientists.

Together we conduct locally relevant, ecosystem-based wildlife research to address pressing conservation concerns in British Columbia's Great Bear Rainforest.

Vision

- To advance **locally relevant scientific knowledge** of grizzly, black, and Spirit bear populations, and the ecosystem that supports these populations, in Kitasoo/ Xai'xais First Nation Territory.
- To support and assist with the development of local **scientific monitoring capacity** within the Kitasoo/ Xai'xais Nation.
- To incorporate **perspectives, knowledge, and priorities from the Kitasoo/Xai'xais Nation** into the development and implementation of our scientific programs.

Objectives

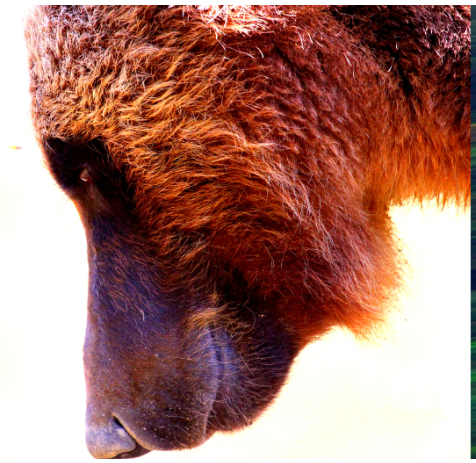
In 2014, Spirit Bear Research Foundation (SBRF) identified and implemented the following research objectives:

1. **Monitor bear distribution and habitat use**
   Continue to monitor changing grizzly bear distributions on islands and expand monitoring efforts to capture bear distribution in new high altitude locations.

2. **Monitor movement of all bear species**
   As species with high spatial needs, bear movement occurs on a landscape scale and varies over time and space. Assessing seasonal movement effectively requires long term data within and across bear monitoring regions (in partnership with the Heiltsuk, Wuikinuxv, and Nuxalk Nations).

3. **Investigate dietary impacts of grizzly bear presence on black and Spirit bears**
   Assess to what degree the presence of grizzly bears might impact the foraging strategies of the less dominant black and Spirit bears.

4. **Long term population monitoring**
   Long term monitoring is necessary to gain an understanding of bear population dynamics and how they vary over time. Adding to our genetic inventory of individuals within and among territories is the first step.



Sampling Methods

Two sampling methods were used to meet our 2014 research season objectives: non-invasive hair snags and remote cameras.

Non-Invasive Hair Snags

We use non-invasive hair snags throughout the Territory as a method to collect bear hair, an important material that provides our researchers a window into the life of each bear we sample. Through DNA and stable isotope based laboratory techniques, one single hair can identify the individuality, sex, and species of each bear we sample and even how much salmon the bear ate in the previous year. These approaches help us answer an important question central to our research program; how does salmon availability influence bear population health?

Beginning in early May, we set up **70 hair snags** throughout the Territory to collect bear hair. We selected these locations based on habitat suitability and success from 2012 and 2013 sampling. The addition of a helicopter as a means of transportation in the spring greatly increased the scope and geographical extent of the hair snags. This resulted in **increasing the number of hair snags from 2013 by 40%** and provided access to remote and mountainous regions of the Territory, which will enable more accurate population estimates.

Sites consist of a barbed wire corral surrounding a large pile of debris, meant to mimic a kill, or a rub tree wrapped with barbed wire (Figures 1 & 2). After constructing the site, we pour a non-reward bait (i.e., no calories to avoid defense or habituation of the site) on the debris pile or tree trunk. Sites are then left and revisited three times during the spring season, every 8-12 days. During each revisit we collect hair from the barbed wire, record the state of the site and then re-baited it.

Figure 1. Remote camera image of a grizzly bear at a rub tree.

Figure 2. Remote camera image of a black bear at a snag station.

After spring sampling was complete, sites were left over the summer and revisited again in the fall. The above sampling protocol was repeated in the fall with a focus on islands to assess continued presence of grizzly bears on islands documented in 2012 and 2013. Following fall sampling, sites were taken down for the winter.

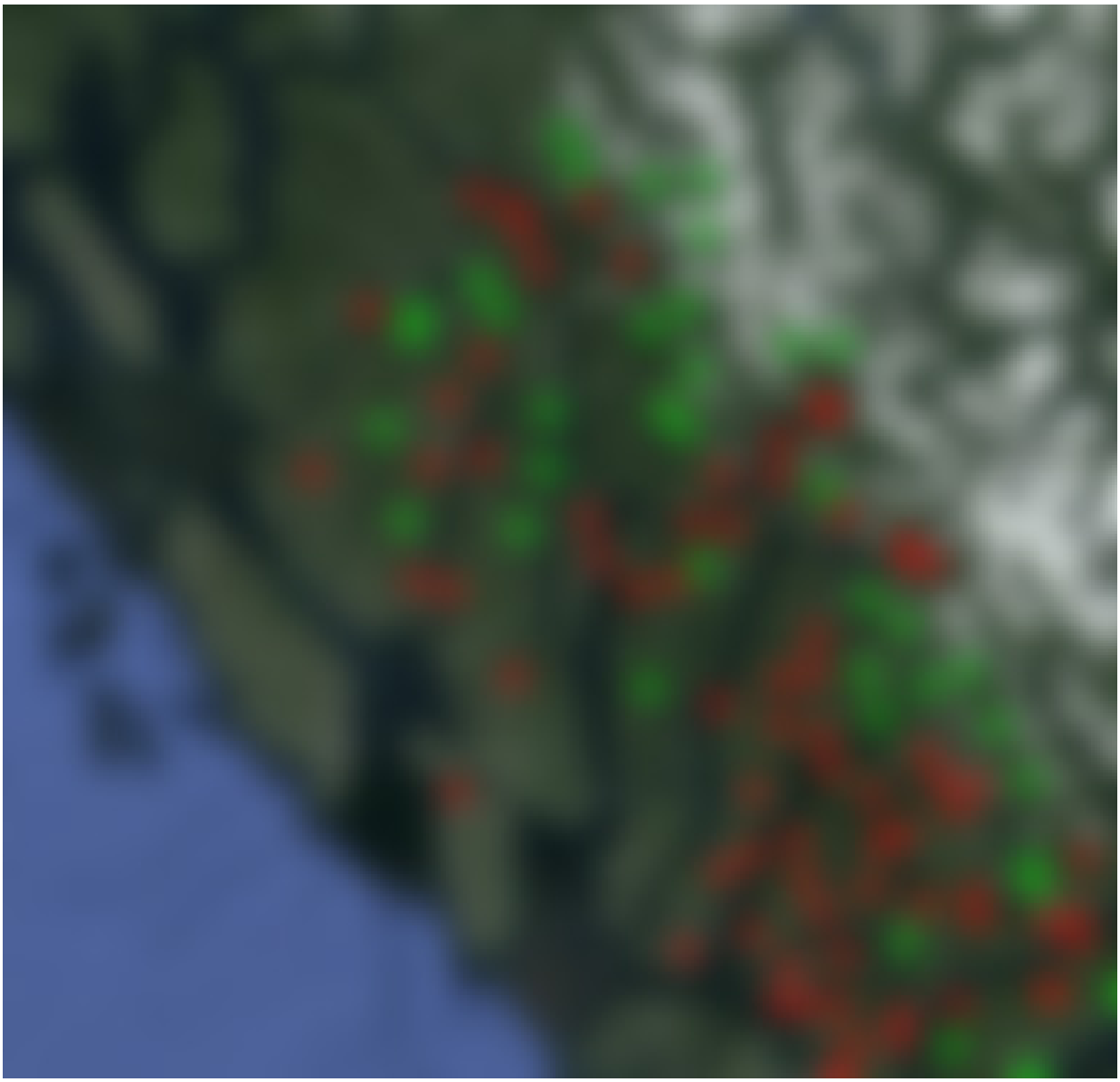


Figure 3. Kitasoo/Xai'xais bear monitoring snag station locations, 2014. Green and red dots represent helicopter and boat based sampling sites, respectively.

Remote Cameras

Remote cameras were deployed across the Territory to monitor bear presence/absence and variation in the times that bears use habitat and salmon. In the 2014 research season, we placed cameras at 43 of the 70 research sites. These cameras record data by capturing images or videos at specific time intervals or when they are triggered by infrared motion detectors. Thousands of images and videos were collected and subsequently reviewed for presence/absence of grizzly, black, and Spirit bears (Figure 4). These data help us understand which habitats are important for bears and how the movement of grizzly bears on to islands might influence black bears.

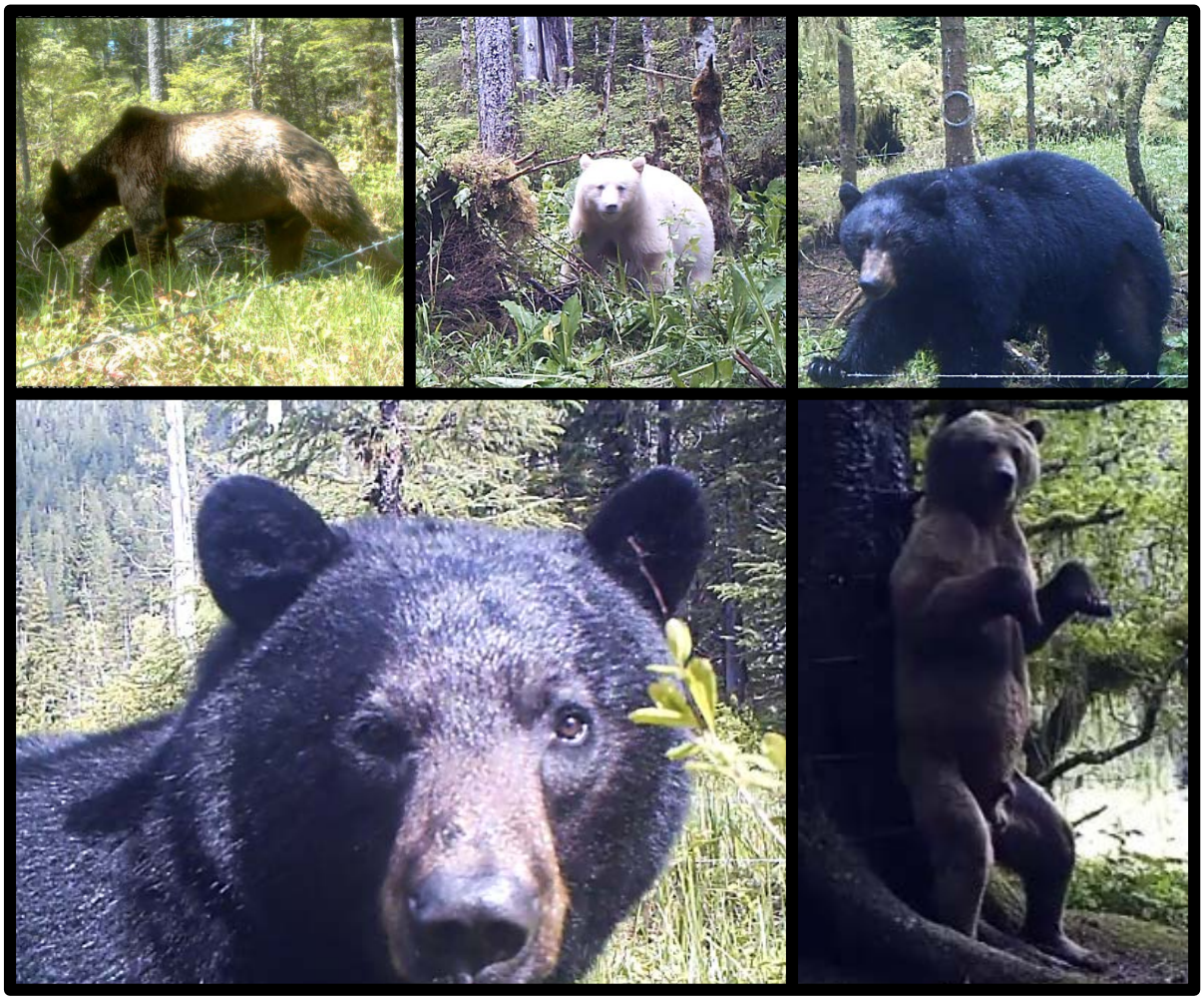


Figure 4. Remote camera images caught in 2014. Top left (clockwise): Grizzly bear, Spirit Bear, black bear, grizzly bear, black bear.

Results

These research sites yielded 1941 bear hair samples during the 2014 field season. Of these samples, only a portion were eligible for DNA extraction based on subsampling rules that optimize the probability of detecting new individuals and minimizing costs. We detected 67 individual bears; 47 black bears (34 male/13 female) and 20 grizzly bears (12 male/8 female). This represents a minimum population size. A full estimate of the entire population will require more sampling and analyses.

1941

hair samples

248

DNA extractions

67

individual bears

(47 black bears & 20 grizzly bears)

Habitat Use

As with 2012 and 2013, we found that mainland and island sites differed markedly in the proportion of species detected. For example, black bears were commonly detected at island sites as well as at mainland sites (Figure 5). Furthermore, Spirit bears (n=4) were only detected at island sites. Grizzly bears were much more likely to be detected on the mainland than on islands. However, four grizzly bears were detected across five sampling sites on three islands and sows with cubs were detected on two islands (Figure 5). This suggests that island grizzly colonization is a population—wide phenomenon and not solely the movement of more mobile males.

Figure 5. Count of individuals detected on islands and on the mainland. An individual could be detected in both habitat types.

Distribution

Sampling by helicopter not only greatly increased our sampling effort, it also allowed us to monitor the distribution of bears more accurately. As illustrated in Figure 6, areas sampled by boat were limited to terrain accessible from shore and consequently only detected bears at low altitudes. Sampling in mountainous terrain via helicopter resulted in detection of many bears in high altitudes, some over 300m.

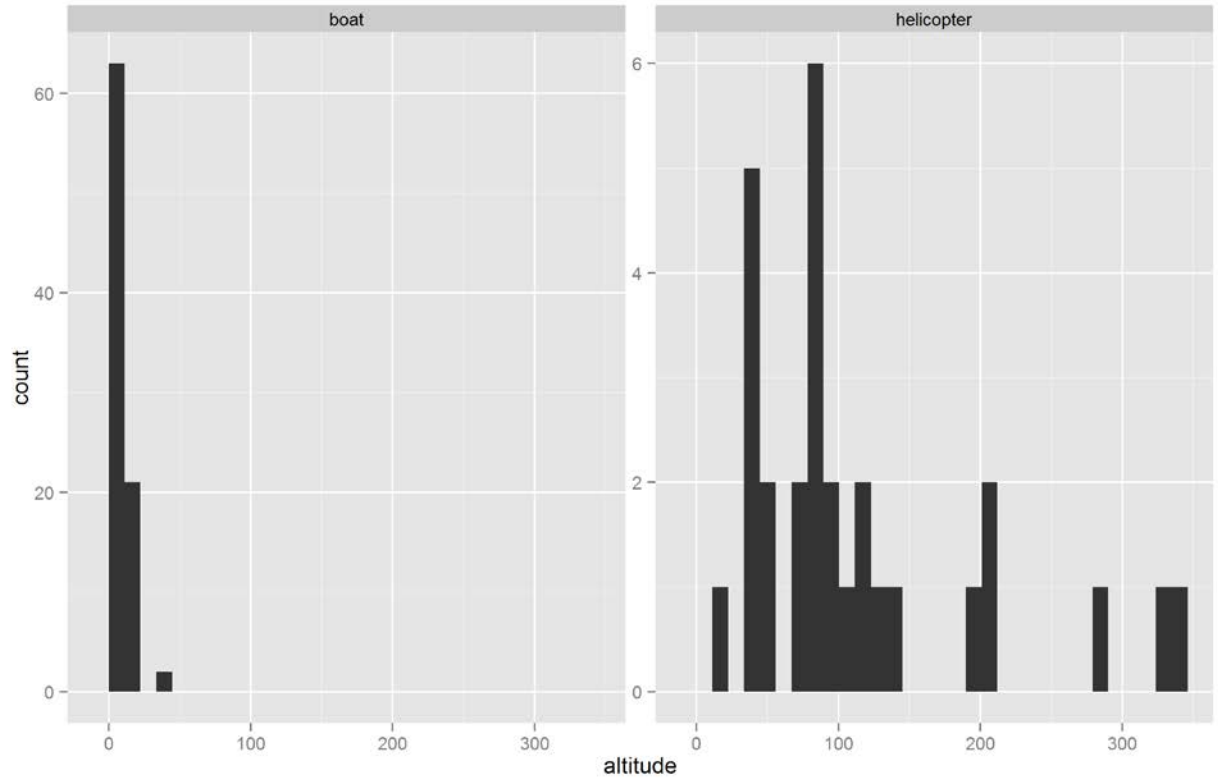


Figure 6. Number of bears detected at different altitudes (meters) by transportation type in Kitasoo/Xai'xais Territory, 2014.

Bears on the Move

Building on bear detections and movements from 2012 and 2013, the data we have collected is beginning to illuminate bear distribution and movement within and beyond Kitasoo/Xai'xais Territory. When we map grizzly and black bear detections we can see how these animals are moving across the landscape. When the same individual is detected in multiple locations, we can see the shortest path between locations, representing inferred minimum movements. These movements reveal that individuals can travel long distances throughout Kitasoo/Xai'xais Territory, with grizzly bears travelling the longest distances. In contrast, black bears are rarely detected at more than one sampling site suggesting much smaller home ranges.

Figure 7. A male grizzly bear detected across projects and in multiple years.

Effects of salmon consumption

We use stable isotope analysis (SIA) on the hair samples to learn about the salmon consumption of each individual bear detected during spring sampling. SIA provides estimates of how salmon consumption (as a proportion of yearly diet) fluctuates with variable salmon returns, and how salmon consumption may vary over space and over competitive landscapes (ie. for competitively sub-dominant black and Spirit bears in the presence of grizzly bears). This analysis process is lengthy. There is one-year time lag between sample collection and SIA results. Therefore, these results are from bear hair collected in 2013. This data set is now being analyzed to investigate how changing distribution of grizzly bears could affect populations of black and Spirit bears in the Territory.

Salmon consumption varies across space for both black and grizzly bears. Most black bear diets consist of 25% salmon or less, whereas grizzly bear diets are dominated by salmon, usually 75% or more (Figure 11). By comparing 2012 and 2013 diet information, this data is beginning to reveal how salmon consumption can change over time.

Population Estimate Update

Overall, hair samples collected in the 2014 field season identified 67 individuals, of which 70% (n=47) were black bears (34 male and 13 female) and 30% (n=20) were grizzly bears (12 male and 8 female). This information is crucial for the long term population estimates we are working on in partnership with our collaborators. Knowing how many individuals we detect each year, the fluctuations in these numbers, and the number of individuals new to our database will help to ensure we get the most accurate population estimates possible. As the reproductive powerhouses of population dynamics, we are particularly interested in the detection of female bears and their patterns of occupancy over space and time. Additionally, female bear home ranges are much smaller than males and as a result their detection provides an even clearer picture of critical habitat. They are, however, more difficult to detect than males (Figure 8).

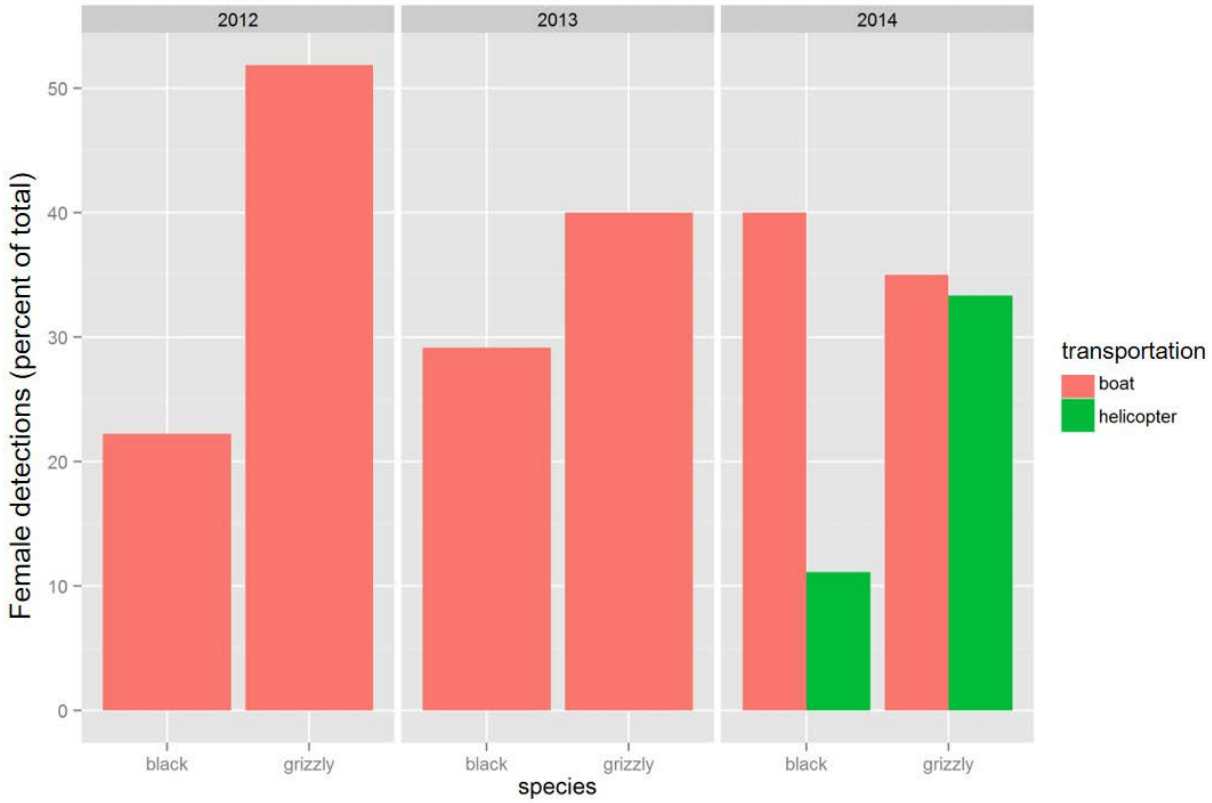


Figure 8. Female grizzly and black bears detection in Kitasoo/Xai'xais Territory 2012-2014 as a percentage of total detections across both sexes.

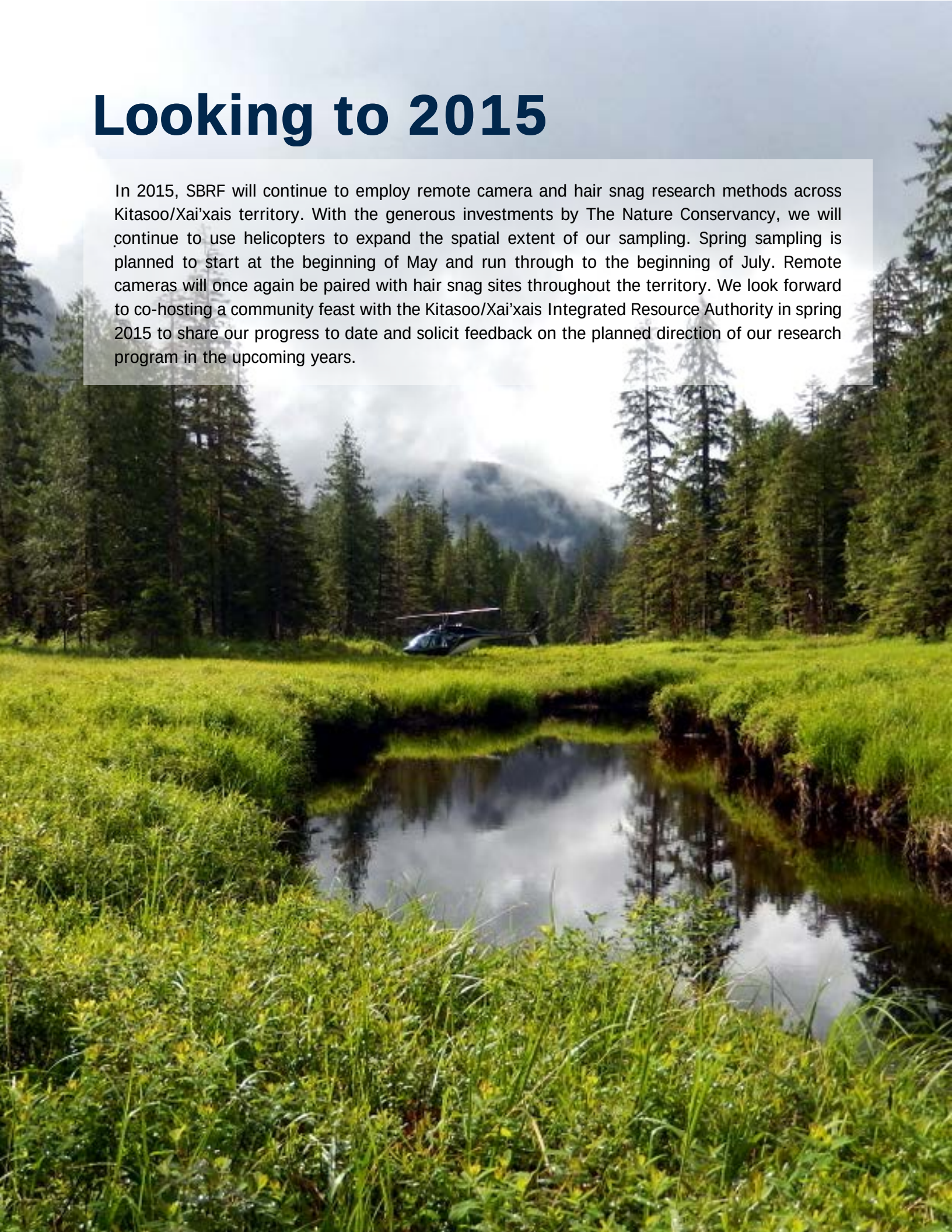
Community

In July, SBRF teamed up with Klemtu SEAS (Supporting Emerging Aboriginal Stewards) interns. These interns (Laverne Barton, Natasha Mason, Robbie Duncan, and Sadie Lobbes) learned about SBRF's research program and visited some of our hair snags. Three of our Research Interns (Sierra Hall, Cole McKnight, and Chantal Pronteau) are also SEAS Alumni!

Throughout the 2014 research season, SBRF **employed six Klemtu community members** and two external researchers as field technicians and skippers, totaling approximately **130 days of employment**. The training associated with the SBRF program offered employees a suite of biological technician skills that **enhance employability** in the future. These skills include proficiency in data recording, sterile sampling procedures, remote camera deployment, and non-invasive research methods. SBRF aims to provide **meaningful conservation based employment,** which gives community members a chance to spend time in their territory and provides external researchers with the opportunity to learn from their Kitasoo/Xai'xais colleagues.

Looking to 2015

In 2015, SBRF will continue to employ remote camera and hair snag research methods across Kitasoo/Xai'xais territory. With the generous investments by The Nature Conservancy, we will continue to use helicopters to expand the spatial extent of our sampling. Spring sampling is planned to start at the beginning of May and run through to the beginning of July. Remote cameras will once again be paired with hair snag sites throughout the territory. We look forward to co-hosting a community feast with the Kitasoo/Xai'xais Integrated Resource Authority in spring 2015 to share our progress to date and solicit feedback on the planned direction of our research program in the upcoming years.



info@spiritbearfoundation.com
spiritbearfoundation.com

Box 104,
Klemtu, BC
V0T 1L0

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