Research Season Summary Report | 2013

Spirit BEAR RESEARCH FOUNDATION

Prepared by:

Christina Service & Rosie Child

With contributions from:

Hakai

RAINCOAST CONSERVATION FOUNDATION

Applied Conservation Science Lab

Contents

Figures

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 First Nation.
- To incorporate **perspectives, knowledge, and priorities from the Kitasoo/Xai'xais First Nation** into the development and implementation of our scientific programs.

Objectives

In 2013, Spirit Bear Research Foundation (SBRF) identified and implemented the following research objectives:

1. **Monitor Grizzly Bear distribution and habitat use**
   Continue to monitor changing grizzly bear distributions on the mainland and on islands.

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. Our partnerships with neighbouring Heiltsuk and Wuikinux Nations' bear monitoring programs allow us to assess seasonal movement effectively with long term data within and across bear monitoring regions.

3. **Investigate dietary impacts of grizzly bears on black and Spirit bears**
   Assess to what degree the presence of grizzly bears impacts salmon consumption of the less dominant black and Spirit bears.

4. **Long term population monitoring**
   Longitudinal population 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 towards implementing such a program.

Sampling Methods

We use two sampling methods to investigate our 2013 research season objectives: non-invasive hair snags and remote cameras.

Hair Snags

We use non-invasive hair snags throughout the territory as a method to collect bear hair, an important material that provides scientists 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?

We begin spring sampling in early May by building **50 hair snags** in different habitat types in the territory. Each hair snag consists of a barbed wire corral surrounding a large pile of debris, meant to mimic a kill. After completing site construction, we pour non-reward (the smell attracts the bear but does not provide a source of calories) bait on the debris pile. We then leave the site and revisit three times: once every 8-12 days. During revisits, we collect hair from the barbed wire, record the state of the site, and re-bait the pile.

In 2013 we monitored a total of 50 sampling sites, 26 on the mainland and 24 on islands. After spring sampling was complete, sites were left over the summer and revisited again in the fall. The above sampling protocol was implemented again in the fall, with a focus on islands to assess continued presence of grizzly bears on islands documented in 2012.

Figure 1. Remote camera image of a black bear.

Remote Cameras

We deployed remote cameras across the Territory to monitor bear presence/absence and variation in the times that bears use habitat and salmon resources. Remote cameras record data by capturing images or videos at specific time intervals or when infrared triggers are detected (Figure 2). In the 2013 research season, we placed 38 cameras around Kitasoo/Xai'xais Territory, including at many of the hair snag sites described above. Thousands of images and videos were collected and subsequently reviewed for presence/absence of grizzly, black, and Spirit bears. This data helps us understand which habitats are important for bears and how the movement of grizzly bears on to islands might influence black bears.

Figure 2. Remote camera images caught in 2013. Top left (clockwise): Spirit bear, black bear, grizzly bear, black bear.

Results

From the 50 hair snags we set up, we collected 1,016 bear hair samples. We carefully selected the samples that were the best quality and most likely to result in unique individuals to send away for DNA analysis. From the samples that we sent away, 249 were successful, and from those successful extractions, we were able to identify 68 individual bear, 44 of which we have never detected before.

Remote Cameras

The thirty-eight remote cameras detected 428 animal encounters during the 2013 field season. A team of volunteers from University of Victoria analyzed each of these encounters and found that 109 of these encounters were of grizzly bears and 140 were black bears. A new encounter is logged every time a minute elapses between recordings so this does not mean we recorded 249 unique bears. On average, black bears spent about 1½ minutes at the research site (within the view of the camera (91 seconds), whereas grizzly bears spent over two minutes (141 seconds). Other species our cameras detected include river otters, mink, martens, humans, wolves, birds, cougars, humans, deer and more!

Population Estimate Update

Overall, the 2013 field season samples identified 68 individuals, of which 71% (n=48) were black bears and 29% (n=20) were grizzly bears. Of these bears detected, 31 of the black bears and 13 of the grizzly bears had never been detected before and were new to our study. To get an accurate population estimate, we need to track how many individuals we get each year, the changes in these numbers year to year, and the number of individuals new to our study each year.

1,016
hair samples

201
DNA extractions
(~70% successful)

68
individual bears
(48 black bears & 20 grizzly bears)

SpiritBEAR
RESEARCH FOUNDATION

As female bears are the reproductive powerhouses of population dynamics, we are particularly interested in the detection of them and their patterns of occupancy over space and time. Females are, however, more difficult to detect than males (Figure 3). Additionally, female bears' home ranges are much smaller than males, and as a result their detection provides an even clearer picture of critical habitat.

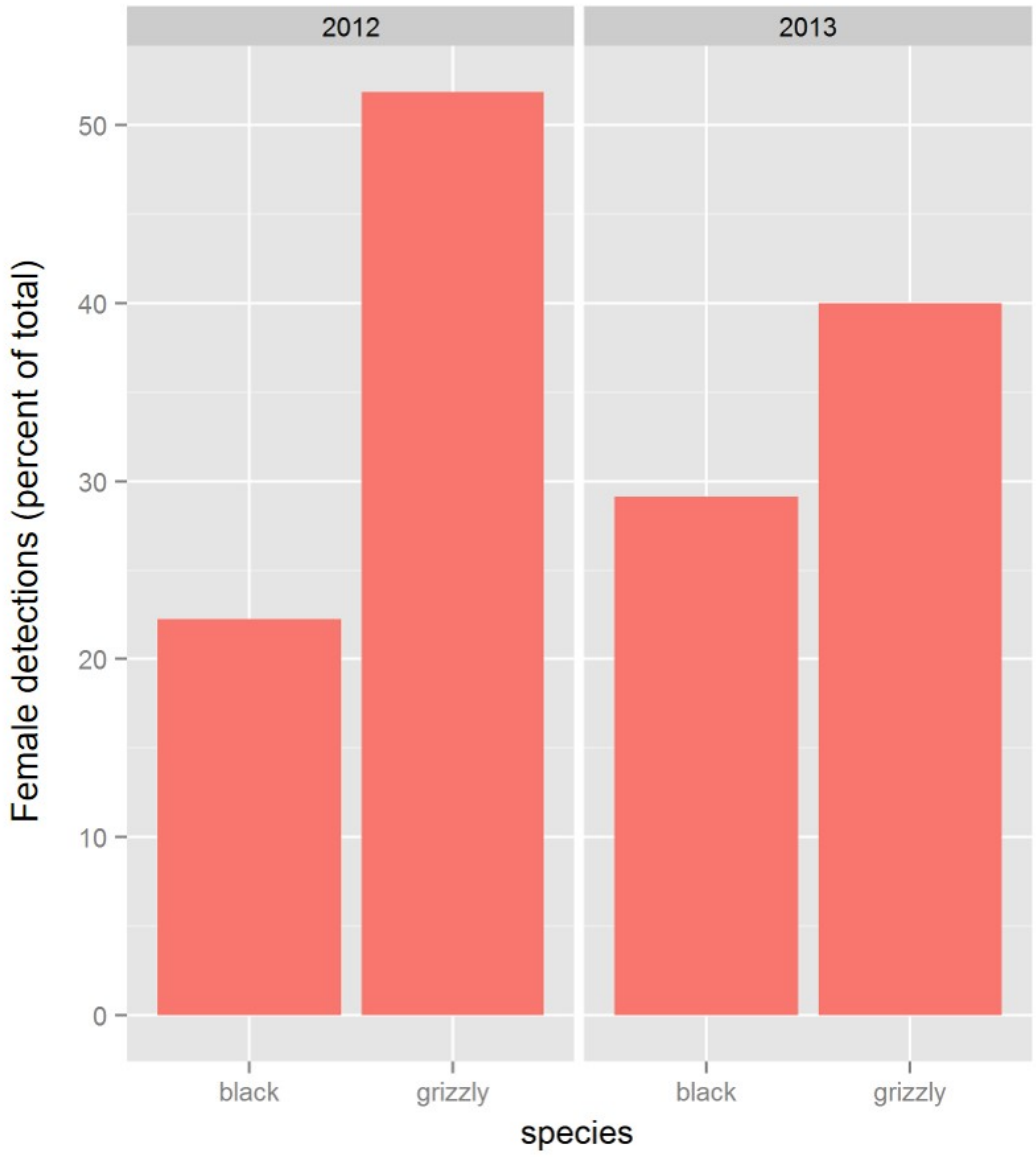


Figure 3. Proportion of female bears detected relative to total detections by year and species.

Habitat Use

As in 2012, we found that mainland and island sites differed markedly in the proportion of species detected. For example, hair snags detected 23 black bears at island sites and 25 at mainland sites (Figure 4). Furthermore, Spirit bears were only detected at island sites. For grizzly bears, hair snags detected only 2 at island sites compared to 18 at mainland sites (Figure 4).

Figure 4. Mainland and island habitat use by species in 2013.

Effects of salmon consumption

After the samples we collect each season are returned to us from DNA analysis, we then conduct stable isotope analysis (SIA) on these same hairs. We use 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 for competitively sub-dominant black and Spirit bears in the presence of grizzly bears. This process takes a long time, so there is a one-year time lag between when we collect the sample and when we get the SIA results. This is why these results are from bear hair collected in 2012. This data is now being analyzed to investigate how changing distribution of grizzly bears could affect populations of black and Spirit bears in the Territory. In 2012, salmon consumption varied spatially across the landscape and also between species (Figure 5).

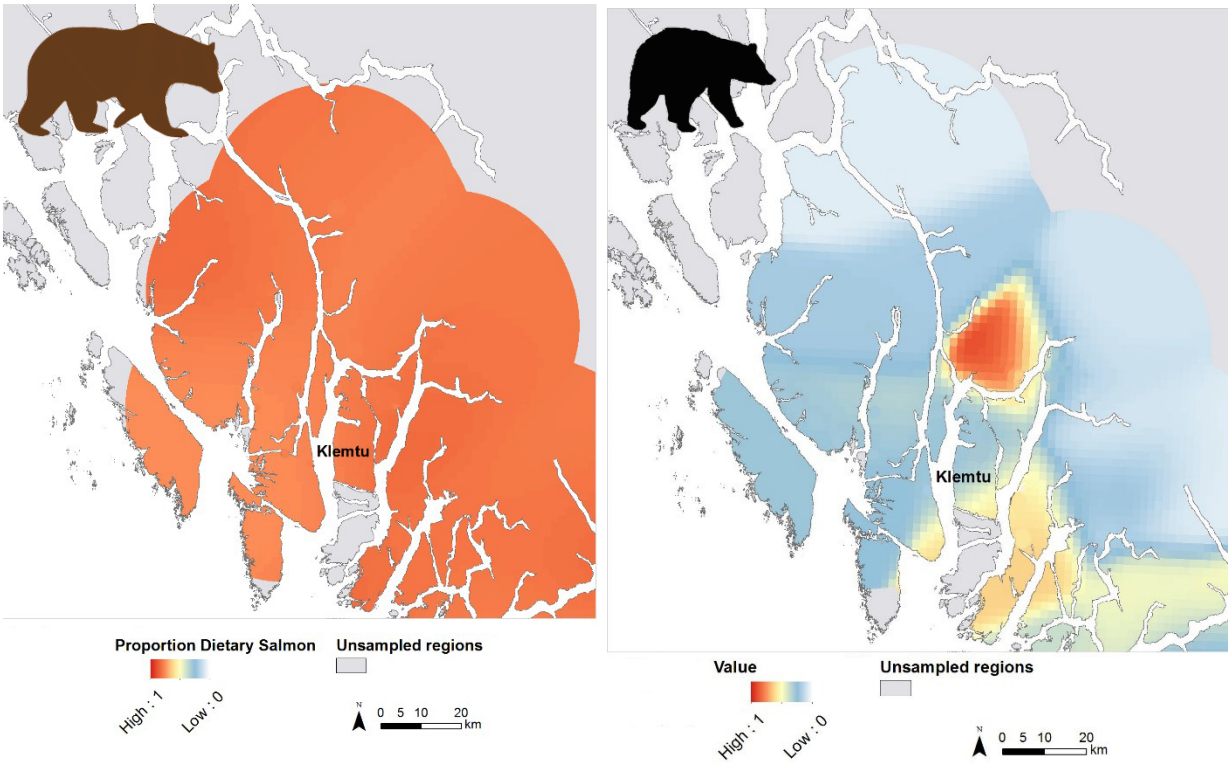


Figure 5. Proportion of salmon in grizzly (left) and black (right) bear annual diets in 2012.

The proportion of salmon in the diet of black bears in 2012 varied greatly, from as little as 5% in some bears to as much as approximately 90% in others. On average, black bear diets consisted of approximately 25% salmon (Figure 6). Conversely, grizzly bear salmon

consumption had little variation and consisted of 75% or more of the diets of almost all grizzly bears sampled (Figure 6).

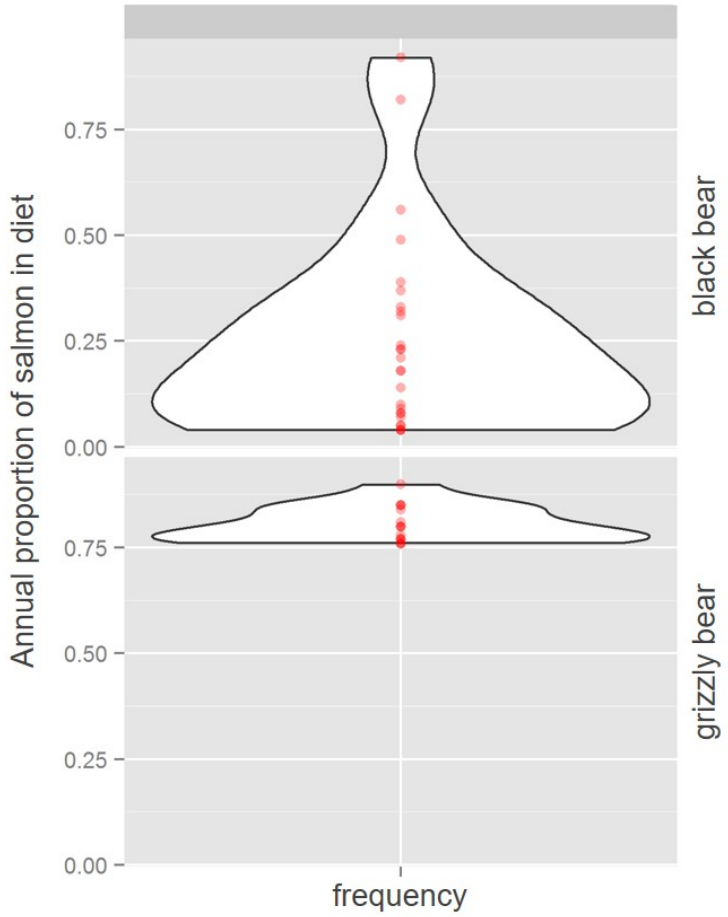


Figure 6. Annual proportion of salmon in diet. Width of white region indicates the relative frequency of bears that consume a certain value of dietary salmon; the wider the width the more bears that eat that amount of salmon.

Community

Community engagement is foundational to our work. Current research objectives and methods were presented by SBRF researchers at the Resource Stewardship Council meeting in May, 2013 and at a community feast co-hosted with Kitasoo/Xai'xais Integrated Resource Authority (KXIRA).

Field Researchers also connected with the Kitasoo Community School, presenting to students about ongoing wildlife research in the Territory and careers in Biology.

In July, SBRF teamed up with Klemtu SEAS (Supporting Emerging Aboriginal Stewards) Interns. The Interns learned about the work we do and helped us to complete a revisit of our hair snags: checking the sites, collecting any hair, monitoring the remote cameras, and re-baiting the sites upon completion.

Throughout the 2013 research season, SBRF **employed seven Klemtu community members** as field technicians and skippers, totaling approximately **~150 days of employment**. The training associated with the SBRF program offered employees a suite of biological technician skills that may **enhance employability** in the future. These skills included proficiency in recording of accurate data, 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 researchers with the opportunity to learn from their Kitasoo/Xai'xais colleagues.

Looking to 2014

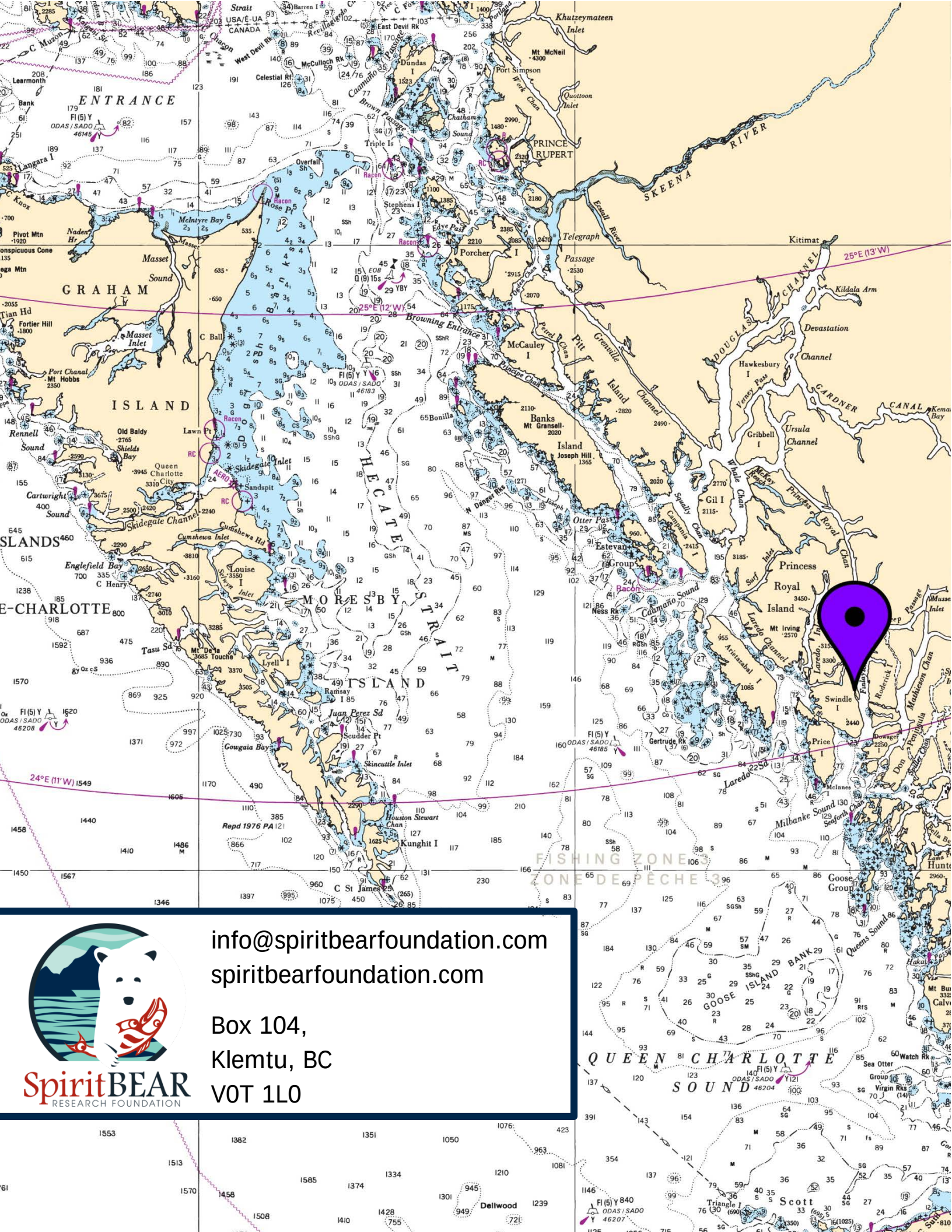
In the 2014 research season SBRF will continue to employ remote camera and hair snag methods across Kitasoo/Xai'xais Territory. As with 2012 & 2013, island and mainland sites will continue to be monitored. We also hope to introduce some helicopter research to our program as this would greatly increase our sampling area, the number of hair sampling sites, and allow access to mountainous regions which is particularly important for our ongoing population estimates. Spring sampling is planned to start at the beginning of May and run through to the beginning of July. Un-baited hair snags will be left up for the summer season, then resampled and deconstructed in October. Remote cameras will once again be paired with hair snag sites during the spring, summer, and fall. We look forward to hiring a youth from Kitasoo Community School through a youth internship position and hosting a community feast to provide research updates and seek feedback.

Gratitude

The 2013 research season was a tremendous success due to the remarkable support from community members, donors, and partners. We are deeply grateful to David Vernon and Tides Canada for their on-going support and to our partners: Kitasoo/Xai'xais Nation, Raincoast Conservation Foundation, and the University of Victoria Hakai-Raincaost Applied Conservation Science lab.

Thanks also to the photographers who contributed to this report:

Douglas Neasloss- Bears (pg.2 & 10)
Cael Cook- Spirit bear (pg.8), sunset (pg.19)
Andrew S. Wright- Landscapes (pg.10)
Rosie Child- Cover image, landscape (pg.3), researchers (pg.4 & 8), & bighouse (p.18)



info@spiritbearfoundation.com
spiritbearfoundation.com

Box 104,
Klemtu, BC
V0T 1L0