

# SPIRIT BEAR 2017 RESEARCH FOUNDATION

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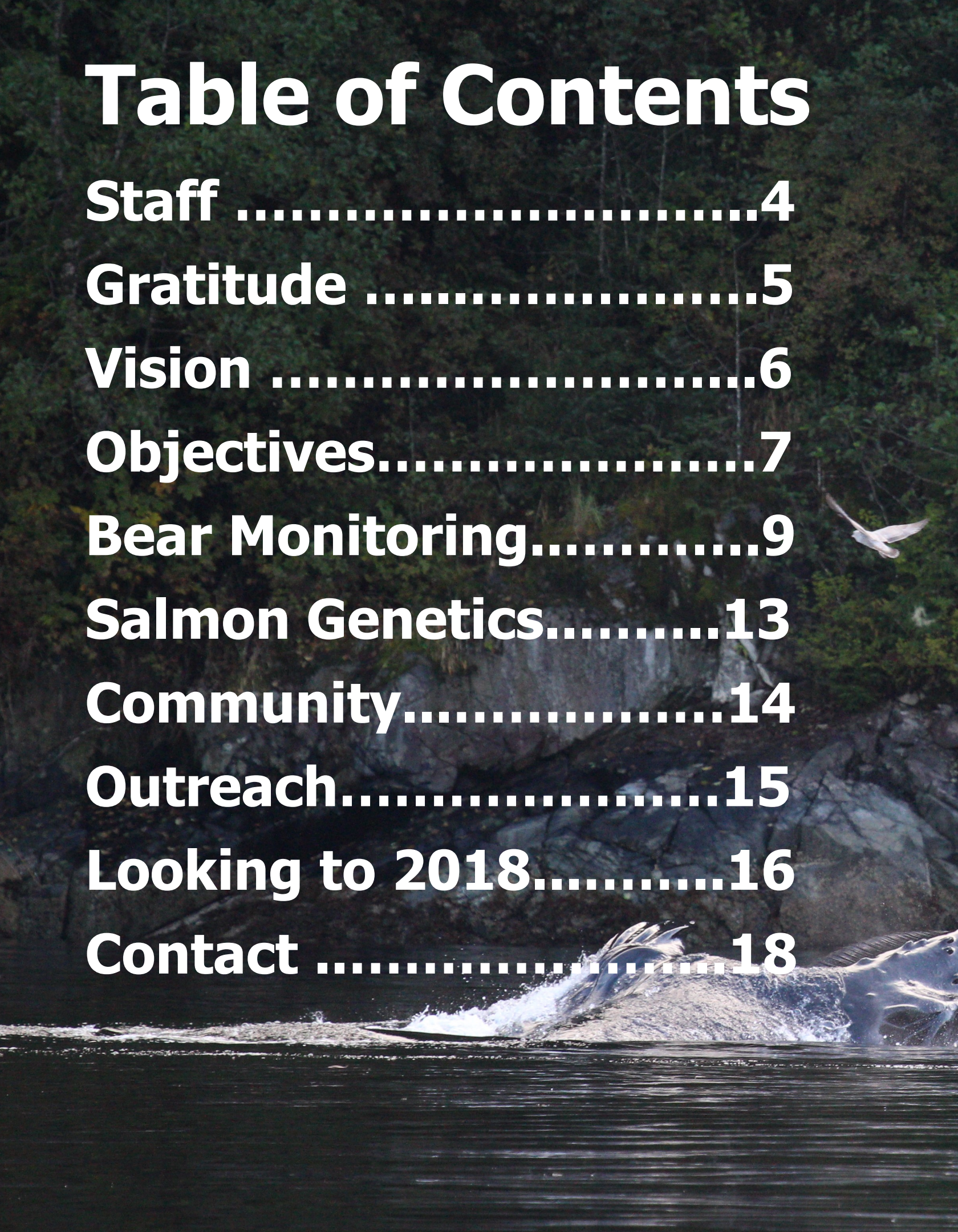


**SpiritBEAR**  
RESEARCH FOUNDATION



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# Staff



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# Gratitude

Long term monitoring programs are only possible with long term support and investment. We are immensely grateful to new and continued supporters for investing in Spirit Bear Research Foundation. Your contributions directly support our research, the coastal bears of the Great Bear Rainforest, the community of Klemtu, and the Kitasoo/Xai'xais First Nation. We welcome all contributions and are able to coordinate tax deductible receipts for donations over \$250.

The 2017 research season was a tremendous success due to the remarkable support from community members, private donors, and partners. We are grateful to Kitasoo Forestry Corporation, Wilburforce Foundation, and Tides Canada for their on-going support. We would also like to thank our collaborators: the Kitasoo/Xai'xais Nation, Raincoast Conservation Foundation, and the Hakai-Raincoast Applied Conservation Science lab at the University of Victoria.

Thanks also to photographers that contributed to this publication: Doug Neasloss, Tavish Campbell, Marlie VanRoy, Santana Edgar, Rye Green, Chantal Pronteau, and Rosie Child.







**Spirit Bear Research Foundation is a collaboration between the Kitasoo/Xai'xais 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 the ecosystems in Kitasoo/ Xai'xais 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

## **Monitor grizzly bear distribution and habitat use**

SBRF continues to monitor changing grizzly bear distribution on islands. We aim to compile this information for the Kitasoo/Xai'xais Nation to increase protection for island habitats.

## **Monitor movement of 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 Gitga'at, Heiltsuk, Wuik-inuxv, and Nuxalk First Nations). We aim to collect data that will help identify important connectivity corridors for local land use planning.

## **Investigate impacts of grizzly bear presence on black & Spirit bear diet**

We aim to assess how the presence of grizzly bears might impact foraging strategies of the less dominant black and Spirit bears. This information will help us understand how to best target conservation for black and Spirit bears on islands.

## **Monitor population size and trends**

Long term monitoring is necessary to gain an understanding of current status and trends of bear populations. By annually adding to our genetic inventory of individuals we have estimated a minimum population size and a full Territory population estimate, from which we can detect trends in relation to habitat and food resources.

## **Monitor local salmon populations by creating a genetic library**

We aim to launch a pilot project that will identify unique salmon populations using genetics. This advance will allow migration routes to be identified and will inform fisheries management to benefit terrestrial wildlife.







# Bear Monitoring Program

## Methods

### 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 analysis, a single hair can identify the individuality, sex, and species of each bear we sample. Certain chemical signatures in the sampled hair (stable isotopes) provide insight into how much salmon each bear ate in the previous year. This dietary information helps to answer an important question central to our research program: how does salmon availability influence bear population health?

Beginning in early May, we set up 71 hair snags throughout the Territory to collect bear hair. We select these locations based on habitat suitability and success from previous years of sampling. Using helicopters sparingly allows us to increase our sampling scope and geographical extent by providing access to remote and mountainous regions of the Territory. This increase in sampling area allows for 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. After constructing the site, we pour a non-reward bait (no calories to avoid defense of or habituation to the site) on the debris pile. Sites are then left and revisited twice 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-bait it. Following spring sampling, we remove all hair snags.

### Remote Cameras

We deploy remote cameras across the Territory to monitor bear presence/absence and variation in the times that bears use habitat and salmon. This year, we placed cameras at 22 of the research sites. These cameras record data by capturing images or videos at specific time intervals or when they are triggered by infrared detectors. Thousands of images and videos were collected and subsequently reviewed for presence/absence of grizzly, black, and Spirit bears. This information helps us understand which habitats are important for bears and how the movement of grizzly bears on to islands might influence black bears.





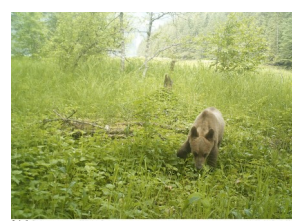
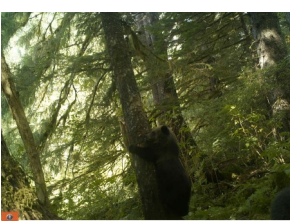
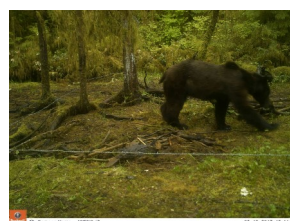
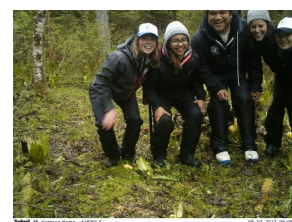
# Results

## Remote Cameras

In 2017, 22 remote cameras were deployed across the landscape. These cameras returned over 60,000 photographs and videos. With the help of dedicated volunteers, we were able to sift through this information and catalogue each unique bear visit (lots of other species also made an appearance) and record information such as the species, size class, sex, time of day, temperature, location, and behaviour.

From the data collected, thousands of these files included bears, from which we logged hundreds of unique visits by bears to our research sites with cameras. This information is immediately useful because we can access it after only 8-12 days (the length of time between research visits), whereas data from the hair takes many months to be analyzed. SBRF researchers are currently working towards incorporating this information into a peer-reviewed publication that documents changing activity patterns of black bears in the presence of grizzly bears and salmon availability.

Bears are not the only visitors to our research sites, other species recorded include: wolves, wolverines, cougars, humans, dogs, cats, squirrels, mice, otters, martens, deer, and a number of birds such as sandhill cranes, Canada geese, robins, bald eagles, and ravens.





# Population Estimates

After a six year investment in our non-invasive genetic mark-recapture study, we are excited to translate our efforts into population estimates for both black and grizzly bears. Led by BC BRF's scientific advisors, Dr. Kyle Artelle, our spatial mark-recapture models suggest that Kitasoo/Xai'xais territory supports an average of 71 grizzly bears a year (95% credible interval of 58-88). These results have been combined with all grizzly bear population estimates from neighbouring bear-managing nations (Nuxalk, Heiltsuk, and Wuikinuxv) and have been submitted for peer review. Black bear models estimates suggests a population size of ~226 per year in Kitasoo/Xai'xais territory (95% credible range 190-260). These results will be used to assess the population size of Spirit Bear in 2018. This modelling approach also allows us to understand hotspots of bear use (activity centres), with implications for conservation planning (Figure 1 below). Notably, hotspots for grizzly bears and black bears occur in different locations, suggesting that land use planning needs to consider the requirements for each species separately.



Figure 1: Activity centre hotspots of grizzly (top panels) and black (bottom panels) bears in Kitasoo/Xai'xais territory (2012-2017)



# Bear DNA

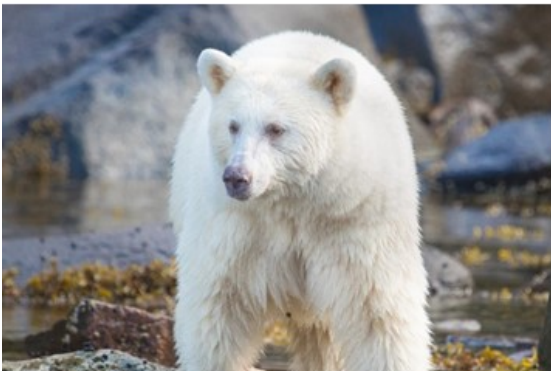
Our 2017 research sites yielded 936 bear hair samples throughout the field season. Of these samples, only a portion were eligible for DNA extraction based on subsampling rules that optimize the probability of detecting new individuals while minimizing costs. Three hundred twenty one samples were selected for DNA extraction and 83% of these samples were successfully run in the lab, in line with previous years. This DNA extraction allows us to identify unique individuals (sensitive information redacted). The count of unique individuals across years is used in more advanced models to calculate a full population estimate (see page 11).



**936**  
hair samples



**321**  
DNA extractions  
(~83% successful)



Sensitive Information



# Salmon Genetics Project

This marked our second year of salmon genetic sampling. In partnership with geneticists at University of Victoria, we sampled fin tissue from spawned out salmon in an effort to understand the genetic diversity of salmon in the Territory. In collaboration with the Kitasoo/Xai'xais Guardian Watchmen, we sampled six different rivers in the Territory. Once fully developed, this genetic library will help identify juvenile fish migration routes and inform fisheries allocations at a local scale. We will continue build on this work in 2018 to inform salmon management and conservation decisions.





# Community

We are grateful for all the interest and support SBRF receives from the community. We love sharing our research in creative ways that allows our science to be useful on the ground. Our goal is to extend our research beyond the university - to children and Elders, in Klemtu and around the globe. Importantly, we learn from community members and incorporate strategies, insights, and priorities of the Kitasoo/Xaix'ais Nation in our work.

## Kitasoo Community School Primary School

During the field season our team had the pleasure of visiting the 1/2 class at the Kitasoo Community School. The students often remember us as the 'Bear people', and remember many facts about bears and parts of our research from previous visits. Each year we can build up on last year's knowledge, and supplement the local knowledge many of the kids already have from seeing bears around their territory. We had a great time building a mock bear research site, investigating a real sample of bear hair, and exploring a map of Kitasoo/Xaix'ais Territory with our research sites on it.



## Spirit Bear Lodge

Klemtu welcomes hundreds of guests from around the world every year at Spirit Bear Lodge. We regularly give research talks to groups at the lodge and hope these guests return home inspired and full of knowledge about bears in Kitasoo/Xaix'ais Territory.



# Outreach

## International Bear Day

Lead researcher, Christina Service, spoke at Capilano University in Vancouver, BC on April 1st as part of International Bear Day. During her talk, Christina shared information about our research programs, moving data into policy, and the importance of community engagement in science.

## Island Grizzly Bear Habitat

In 2017 we provided data collected from our bear monitoring efforts over the past years to map grizzly bear habitat on islands in Kitasoo/Xai'xais Territory. Using bear genetic data, remote camera data and local observations all informed this work. We expect this work to be ground truthed, finalized and implemented in 2018.

## Local Hiring

In 2017 we hired a local skipper, two field technicians, and two high school interns. The local knowledge, enthusiasm, and passion that our local team members are essential to the success of our research projects.





# Looking Forward to 2018

## Spirit Bear Genetics

We plan to identify Spirit Bear gene hot spots across the Territory and compare these to existing protected areas to identify conservation gaps and opportunities. Looking only at where white bears exist doesn't give us the full picture because black coated black bears can also carry the recessive gene responsible for white bears.

## Cultural Feature Inventories

Over the winter and spring, we plan to develop and implement a standards manual to guide cultural feature inventories, which will help us to identify and protect cultural features throughout the Territory. We will also provide training opportunities so this work can be undertaken by a local team of field technicians. Features to be inventoried include culturally modified trees, aboriginal forest resources (eg. Devils club and Hellebore), monumental cedars, and yew trees.



## Ecosystem Based Management

We are looking forward to expanding our wildlife research program to include local monitoring of other ecosystem-based management (EBM) focal species in addition to grizzly bears: northern goshawks, mountain goats, marbled murrelets, and coastal tailed frogs. This year we participated in a learning exchange at Kvai with our Heiltsuk neighbors, which is helping to guide us as we start to develop our EBM methods moving forward. During 2018 we will be exploring locally appropriate survey methods with the potential to pilot several small scale surveys targeted towards priority focal species.









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