

A recessive gene is responsible for the spirit bear's distinctive coat.

COMPLEMENTS
GHOST BEAR FAMILY
PART OF THE NATURAL WORLD SERIES
TWO

Spirits of the forest

Canada's forests are home to ghostly bears that have a key advantage over their darker cousins, but incoming grizzly bears pose a new threat. **Isabelle Groc reports.**

Photos by **Daisy Gilardini**



The Great Bear Rainforest is exceptionally damp, dense and dark, particularly in autumn. The Canadian film-maker Jeff Turner was exploring this vast area when a strikingly white, ghost-like animal suddenly appeared. It materialised out of the gloomy greens and browns of the forest and ambled towards the riverbank. "These pale animals just look so unique," he says, remembering his first encounter with a spirit bear. "They seem totally out of place in this environment."

Dubbed spirits of the forest, these are Kermode bears *Ursus americanus kermodei*. They are a subspecies of the North American black bear with a rare recessive gene that makes their fur white or cream, nigh-unbelievably so. "Spirit bears almost glow – they have this aura about them," Turner says. "When you see one for the first time, it's magical. You can't quite believe your eyes."

Jeff and Sue Turner met their first white bear in the 1980s, and in 1990 became the first to make a documentary about these mammals. Spirit bears are found only in the Great

Bear Rainforest, a 6.4 million ha ecosystem on British Columbia's north and central coast. The world's largest intact temperate rainforest, this is a stunning landscape

THE BEARS PLAY A KEY ROLE IN THE ECOSYSTEM, CONTRIBUTING TO THE GROWTH OF THE FOREST.

Above: spirit bears, such as this female and her cub, like to munch on barnacles and mussels at the seashore. Here an old tree has fallen into the water, providing a perfect habitat for their prey. **Right:** spirit bears are good climbers thanks to their short, curved claws. This one has led her two-year-old cub up a huge tree because a grizzly is nearby.



of narrow fjords, pristine islands and crystal-clear, salmon-filled rivers adjacent to the Pacific Ocean.

No one agrees on the exact number of spirit bears living in this corner of the world, but the best estimate is no more than about 400 individuals. One in ten black bears is pale, and to produce pale cubs both parents – white or black – must carry the gene that results in the white or cream-coloured coat. The First Nations communities that have lived in the region for thousands of years call the spirit bear *moskgn'ol*, which simply means 'white bear', and view the animal as sacred.

FISHING PHANTOMS

Scientists have long wondered whether a white coat gives the spirit bear any special advantage, and a few years ago a study led by Thomas Reimchen from the University of Victoria's Department of Biology demonstrated that white bears are more successful at catching salmon in daylight compared with black ones. In the same way that many seabirds around the world are predominantly white, pale bears are better camouflaged than dark ones by day, because they contrast less with a bright sky background, so salmon don't notice them as much. At night, black bears become more successful.

Pacific salmon are the lifeblood of the

Great Bear Rainforest (see box, p80). They hatch in the gravel beds of streams in the headwaters, swim out to the ocean then return several years later in autumn to spawn and die in the streams where they hatched. This is the time of year that spirit and black bears are waiting for. They emerge from the forest to feast on the spawning fish – mostly pink, chum and coho salmon – for a few weeks. They store as much fat as possible before going into hibernation in cavities inside giant old trees.

The bears play a key role in the ecosystem, contributing to the growth of the forest by spreading marine nutrients. They carry salmon carcasses deep into the forest, where the fishy remains are eaten by gulls, ravens, bald eagles and other scavengers. As the carcasses are absorbed by the forest floor, the nutrients from the ocean are effectively transferred to the trees. "When you go to a river, and when bears are taking salmon, you see bigger trees," notes Douglas Neasloss, a local First Nation leader and bear-viewing guide. "Like gardeners, the bears are fertilising the forest floor."

Neasloss reports significant changes in salmon returns during only a couple of generations. "Our elders remember when the salmon were so thick that you could walk across their backs," he says. Today, because of overfishing, loss of habitat, clear-cutting, ▶

The salmon run provides the best chance of seeing spirit bears (above) as they leave the forest to fish, but they now face stiff competition from grizzly bears (left).



AN OIL-PIPELINE PROJECT HAS BEEN PROPOSED THAT WOULD BRING TANKERS INTO THE REGION.

PACIFIC SALMON BACKBONE OF THE FOREST

The ecological and cultural legacy of Canada's Pacific coast is shaped by wild Pacific salmon. The fish feed the plants, bears, wolves, bears and other wildlife of the marine and terrestrial environment. There are five Pacific salmon species. In the Great Bear Rainforest, bears mainly feed on pink, chum and coho salmon. Pink salmon, the smallest species, have a two-year cycle from the egg stage on the home stream, developing into small fry,

travelling far out to the ocean, and returning as adults to spawn and die in the stream where they were born. In contrast chum salmon have a four-to-five-year cycle from the egg stage to their return as a spawning adult.

For all salmon species spawning starts in early September and ends in late October. This is the prime time to view the bears because they come out from the forest to capture salmon in the streams.



The salmon run is crucial for the bears' survival, but fish populations have plummeted in recent years and raised the stakes. These three pictures show a spirit bear (above) with her black cub (right) and confronting a black bear rival for access to a fishing spot (opposite).

Her samples provide a window into the lives of the animals. For example Service can tell if the bears have been experiencing stress, as well as how much salmon they have been eating and when. She has also set up 42 remote wildlife cameras in the forest to follow the bears. Through her research Service has detected an increasing number of grizzlies – specifically females with cubs. “This indicates that their population is here to stay,” she says.

This might be bad news for spirit bears. Grizzlies are larger and stronger, and usually chase other bears off from prime fishing spots. “I go to some rivers that used to be 100 per cent spirit and black bears,” says Neasloss. “All of a sudden a grizzly shows up and the whole system changes.”

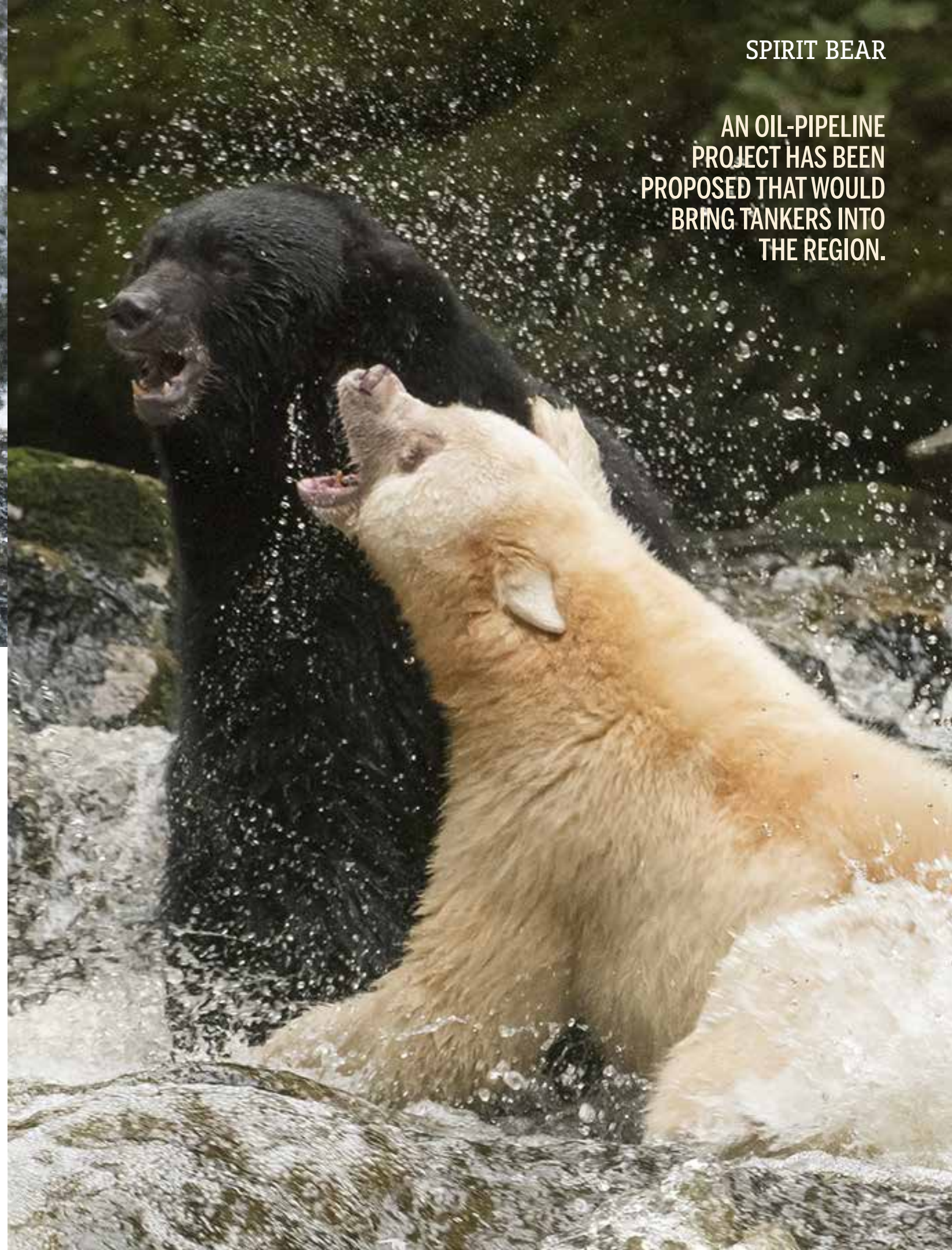
This is not the only threat that the spirit bears are facing. Twenty-five years after his first documentary, ►

changes in marine productivity and the warming climate, the number of salmon returning to their home streams to spawn has declined drastically. Neasloss points to a river system where the fish are now down to a population of just 4,000–5,000, compared with 80,000 originally [when?].

GRIZZLY INVASION

Salmon declines influence the dynamics of the ecosystem overall. Traditionally spirit and black bears have ruled the small islands, where they have lived without competition. But in the past decade Neasloss and other First Nation community members have noticed new visitors to the islands: grizzly bears. Because numbers of salmon are down, grizzlies travel farther to look for food and are encroaching on spirit bear territory for the first time.

Since 2012 Christina Service, a biologist with the Raincoast Conservation Foundation and Spirit Bear Research Foundation, has collected more than 4,600 samples of bear fur through hair-snagging stations in the Great Bear Rainforest, in an effort to improve our understanding of the relationship between salmon and bears. “Salmon is the name of the game and drives bear population health,” she says.





The Great Bear Rainforest covers 6.4 million ha.

OTHER TEMPERATE RAINFORESTS OF THE WORLD

APPALACHIAN FORESTS

USA/CANADA

Hugging North America's eastern seaboard, the Appalachians stretch 2,400km from south-east Canada to the southern states of Georgia and Alabama. The wettest sections in the south may receive over 100cm of rainfall annually – often taken as the benchmark for temperate-rainforest status – and are particularly rich in mosses and amphibians.

ATLANTIC OAKWOODS

BRITISH ISLES

Sustained by a very mild, wet climate, these gnarly old oakwoods are the closest the British Isles have to true rainforest. A classic feature of south-west England, West Wales, Cumbria, Ireland and the west coast of Scotland, they support diverse ferns, lichens, liverworts and mosses. Wonderful examples include Wistman's Wood

on Dartmoor and the Great Wood at Derwent Water, Cumbria.

KNYSNA AND AMATOLE FORESTS

SOUTH AFRICA

Southern Africa generally has much less tree cover than West, Central or East Africa, so these relatively small pockets of temperate rainforest are exceptional and support many endemic species. The Amatole forests lie inland and cloak mountainsides, with lush vegetation and rushing streams, while the Knysna forests carpet lower hills on the Cape coast.

SOUTH ISLAND FORESTS

NEW ZEALAND

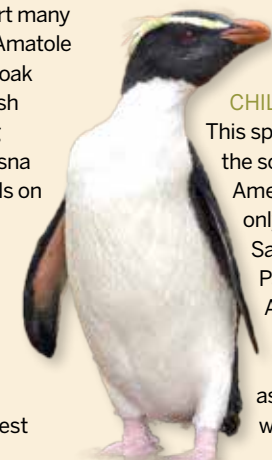
The dramatic, rain-drenched mountains and fjords along the west

coast of South Island support New Zealand's most extensive surviving forests, which shelter large numbers of endemic plants and animals, including kiwis and fjordland crested penguins (*pictured*) – the only penguins that breed among trees. Key tree species include the southern beech and conifers in the family Podocarpaceae.

VALDIVIAN FORESTS

CHILE/ARGENTINA

This spectacular forested area in the south-west corner of South America is the continent's only temperate rainforest. Sandwiched between the Pacific and the Southern Andes, it is home to millions of antarctic beech and monkey puzzle trees as well as one of the world's largest woodpeckers, the Magellanic.



Jeff Turner and his family returned to the Great Bear Rainforest. In *Ghost Bear Family*, which aired on BBC Two in July, Turner tells the story of a spirit bear and her two black cubs, including a dramatic encounter with a large male black bear on a creek. Turner noticed subtle changes in spirit bear territory since his visit in the 1980s: "On the surface you look at the place and you could say nothing is different. But in other ways it has changed a lot. It is a big intact ecosystem, but we continue to chip away at it."

CONSERVATION CRUSADE

In the 1990s First Nations and environmental groups joined forces to campaign to defend the region from destructive logging. In 2006 a landmark agreement was reached to protect a third of the Great Bear Rainforest, though environmentalists continue to advocate for further protection. "We have come a long way since 1997," says Wayne McCrory, a bear biologist with the Valhalla Wilderness Society who has played an important role in the Great Bear Rainforest's conservation. But spirit bears still face a host of threats.

McCrory is concerned about the lack of adequate logging guidelines to protect the big old cedar trees that the bears depend on for hibernating and giving birth to their young. More recently an oil-pipeline project was proposed that would bring tankers into the region. "An oil spill would have a catastrophic effect on the coastal bears and the ecosystem," says McCrory, who authored a report on the subject called *Spirit Bears Under Siege*.

Above and opposite: the Great Bear Rainforest may look peaceful in these photos, but the spirit bear population is threatened by a number of factors, including hunting and habitat loss.

GRIZZLIES ARE TRAVELLING FARTHER TO LOOK FOR FOOD AND ENCROACHING ON SPIRIT BEAR TERRITORY.

The government of British Columbia also allows the hunting of grizzly and black bears in the Great Bear Rainforest. So while it is illegal to kill a spirit bear, hunters may shoot a black bear that carries the crucial gene. In contrast the Coastal First Nations banned the trophy hunting of all bears in the region in 2012. "Spirit bears have to compete against declining salmon, trophy hunting, resident hunting and grizzly bears," says Neasloss.

The ban makes economic sense, too. A recent study showed that, in 2012, bear-viewing companies in the Great Bear Rainforest generated over 12 times more in visitor spending than bear hunting: \$15.1 million compared with \$1.2 million.

While the world around them is changing, the spirit bears have retained the timeless, magical qualities that first attracted Turner to the Great Bear Rainforest. He recalls that when he first filmed the bears in the 1980s the animals had not seen many people and had little fear. Even in 2014, over two decades later, he was able to develop a similar relationship based on trust and respect with the mother and cubs that he followed for a season.

"Spirit bears are incredibly accommodating, gentle and tolerant," Turner says now. "They have individual personalities, and approach the world much as different people would approach the world." 🐾

FIND OUT MORE

📺 **TWO** *Ghost Bear Family* aired in July. You can watch clips at www.bbc.co.uk/programmes/b063m3d7

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