Salmon Run

Every four years, during the glorious days of late Indian summer, a miracle of nature takes place in the rivers and lakes along the Canadian Pacific coastline. Rivers, creeks and lakes alike teem with uncountable numbers of different salmon species. The formerly quiet, clear blue waters of Adams River, for instance, then turn red from the biomass of countless sockeye salmon.

By a phenomenon that is not yet fully understood, the salmon remember their place of birth and return to it from a life out in the vast ocean to spawn and die. In a spectacular circle of life, young salmon hatch in the following spring and start the perilous journey down the freshwater paths of western Canada and Alaska in a reversal of their parents' voyage until they reach the salty waters of the Pacific Ocean. There they spend most of their life. But every autumn a mass migration sets in and thousands of mature salmon return to their origins to spawn and set off the wondrous circle of life and death again. When this happens, the tranquil rivers are filled to the brim with a teaming crowd of chum, chinook and coho salmon eager to reproduce. Only the famous sockeye salmon turn a bright red when they approach their mating stage and this makes Fraser River with its upper extensions Lake Shuswap and Adams River a colorful feast for the senses. In a quadrennial cycle, the sockeye salmon here return not only by the thousands but by several millions. 2014 was one of those wondrous years in which an estimated 30 million of returning sockeye salmon allowed the delighted visitor to observe a unique natural phenomenon.

This spectacular sight is a number one on any nature photographer's wish list. It requires superb skills in both underwater and nature photography in order to capture this sublime phenomenon. The restricted number of photographers that are allowed into the shallow waters spend hours on end in the cold rivers, partly submerged, to catch shots of a lifetime. Yet, it is a rare privilege to become witness of nature at its best.

It all begins with a small egg. The fertilized eggs lie hidden underneath the gravel, sheltered by tiny stones from predators and harsh winter frost. The secret nursery is already teeming with life as the young fish gain in size and are nourished by their yolk sacs. In the springtime, the eggs hatch and tiny fry about one inch in length emerge. When their yolk is finished,

Photos: Werner Thiele (all pictures pages 26 to 33)

they leave the protected shelter of the gravel. During the night, the fry drift downstream to the closest lake where they spend their first year. The initial part of the salmon journey deliberately takes place during the night, when the fry are more likely to avoid encounters with hungry rainbow trout and other predators. Once arrived in the lake, the fry feast on small crustaceans and plankton and grow in size. From the originally about 8,000 eggs that one female salmon lays on average, many eggs fail to be fertilized, others are dislodged from their gravel beds and others are devoured by predators as a small delicacy. Of the about 800 fry that make the journey to the nearest lake, three out of four will be eaten by the end of the first year.

The fry spend a year in the lakes, feeding and growing in size, and turning into parr—young salmon about three to four inches in length. Parr show distinctive camouflage-like patterns of spots and vertical bars. Now it is time to explore new territories—the parr have outgrown their kindergarten. They begin making their way downstream once again. Their journey takes them up to unbelievable 300 miles in freshwater until they reach the brackish waters of the river estuaries. At this point in their life, the young salmon are called smolts and undergo significant changes in their body chemistry to allow them to adjust to the imminent shift from freshwater to saltwater. Simultaneously they grow their distinctive silvery scales and reach a size of about seven to eight inches.

When their ability to cope with the salt level of the ocean is fully developed, the smolt swim out of the estuaries into the open waters of the Pacific Ocean. They form large schools of young salmon and live for up to four more years in the northern areas of the Pacific Ocean, thriving and fully developing their reproductive capabilities. They reach an average weight of six to seven pounds. But life for these youngsters is not without threats. Salmon are highly sensitive to the slightest rise in water temperature, increasing their susceptibilities to disease and decreasing their changes in competing with other species for food. Moreover, salmon are much-loved prey for orca and seals. Finally, the human hunger for salmon is insatiable and many salmon are caught in commercial fishing.

The salmon spend between three and five years in the Pacific Ocean. Generally, at the age of 4 years, a genetic signal tells the salmon to start their journey back home. With an uncanny instinct, the salmon find the way back to their original birthplaces. The process behind this pinpoint precision is not yet fully understood. It is believed that geomagnetic and chemical cues guide the salmon. Some believe that a sensitivity to magnetic fields allows the salmon to navigate by the earth's magnetic field. Others cite the salmon's extraordinarily well developed sense of smell and the fact that every river has its distinctive odor for salmon.

Not all salmon reliably find their place of birth. Some migrate to nearby rivers. This may be nature's ruse to ensure that new habitats are populated and that the gene pools are mixed. On Fraser River, the number of salmon returning to their birthplaces spikes every four years. Yet, some precocious fish return as 3-year-olds and are then referred to as "jacks" and "jennies". Others may spend another year in the ocean and only return as 5-year-olds. Thus, the variety of genes within one river is mixed up as well to avoid genetic deficiencies due to lack of fresh genes. Yet, the vast majority of salmon adheres to a four-year cycle—and in fact has done so for several thousand years, dating back to the last Ice Age.

Before the salmon run up their home rivers in a truly wondrous miracle of nature and a rare incident of mass migration, they undergo significant physiological changes. The fish stop eating and start to rely on their accumulated body fat and protein to sustain their bodies in the physical challenges ahead. The drop in salinity in the estuaries and later in the rivers and the olfactory stimulation by the home river's odor seem to trigger off an increase in sperm and egg production. Furthermore, the red muscles that were previously used for sustained activities like ocean swimming become less important. The fish start relying on their white muscles that are used for bursts of activity, allowing them to make vertical jumps up to 12 feet high, since they must conquer lots of physical obstacles like currents and rapids. In addition, predators like bears and eagles eagerly await the salmon's return and feast on them. When the salmon come closer to their places of origin, they undergo rapid and

HIDDEN UNDERNEATH THE GRAVEL
EARLY CHILDHOOD IN RIVERS AND LAKES
FROM EGG TO FRY

THE ETERNAL CYCLE OF LIFE
FROM FRESHWATER TO SALTWATER
FROM FRY TO SMOLT

MATE READY: THE SILVERY SCALES CHANGE INTO A RED HUE AND THE MALE SALMON'S JAWS TURN INTO A PRONOUNCED CURVE

HOMEBOUND TO DIE
MATING AND SPAWNING
FROM SMOLT TO SALMON

radical morphological changes. The silvery scales make way for a deeply red hue. The male salmon develop hook-like teeth and their jaws turn into a pronounced curve. Sockeye salmon grow large impressive humps on their backs and both the heads of males and females turn a dark green. The bellies of female salmon swell with up to 8,000 eggs. Out of the 8,000 eggs that were laid approximately four years ago, now only two fish return to fulfill their task and complete the cycle that their parents began. The female salmon builds a spawning nest—called a redd—by lifting gravel into the current that is promptly swept away. Thus a shallow depression is created into which the female lays her reddish eggs. One or several males approach the female salmon and spill their sperm over her eggs. The female then covers her nest with gravel and moves on to create another redd until her supply of eggs is exhausted. Male salmon defend their redds by chasing intruders and biting them with their hook-like teeth. Obviously, mating and spawning is not a tranquil and peaceful process. There is a relentless upstream race for the best spawning sites and salmon fight for space against others.
Now that everything for the well-being of their offspring is prepared, the condition of the adult salmon deteriorates rapidly. Exhausted from the strenuous upstream journey, the efforts to escape predators like bears and eagles, and spawning itself, the fish die. Birds swoop down from the trees and feast on the dead fish everywhere. At night, mink, bears and coyote prowl the riverbanks and take their share of the banquet. Some salmon rot and decay and thus provide nutrients like nitrogen, sulfur, carbon and phosphorus that are transferred back into the ecosystem. Their carcasses provide the basis on which their young offspring will feed in spring. By mid-November the spectacular phenomenon is over and the rivers return to their peaceful state when snow starts falling and ice partly covers the rivers. But deep underneath, in the sheltered waters of the rivers, a new cycle of life has already begun.

The wondrous sight of the salmon run is sure to fascinate every nature lover with its spellbinding impact, the scale of organisms on their way, the nearness of birth and death and the salmon's sacrifice to ensure that their offspring not only survive but thrive. Every year, thousands of people arrive in the national parks along the Canadian and Alaskan Pacific coast to become witnesses of the salmon's circle of life. Every four years, about 30 million of salmon flood the Fraser and Adams River system, for instance, and the number of visitors who stroll along the trails lining the riverbanks exceeds 200,000. The salmon traditionally symbolize persistence, provision of life, wealth and prosperity, dependability, renewal of life and good luck when they come in pairs and nature lovers from all around the world want to partake in this extraordinary event. Yet, being in the waters together with the salmon within touching distance is a special privilege. One cannot help being awed and inspired by the colorful display of fertility and nature's master plan for the continual existence of this species. One almost feels obliged to immortalize nature at its best for those who cannot take part in this spectacle and provide them with close-up shots of nature's perfection.

DR. IRIS SCHMIED-THIELE

» THE PERFECTION OF NATURE IS AWE-INSPIRING «

Werner Thiele

Especially as an underwater photographer I enjoy the most fascinating and versatile workplace I can imagine: the variety of bodies of water never ceases to amaze me, be it the majestic floating icebergs in Antarctica, the pristine coral reefs in Melanesia, the crystal clear waters of Lake Baykal, the freshwater wonders of Lake Malawi or the shallow depths of Adams River. Our planet is inadequately referred to as "earth", when it obviously is a world of water. The oceans are teeming with life in ways perhaps only science fiction authors can imagine. The diversity, creativity and perfection of nature are simply awe-inspiring. Whenever I submerge, I feel how gravity seems to release its pull on my photo gear and how the camera becomes a natural extension of my arm. I merge with my surroundings and my curiosity about what I am about to discover is only matched by the inquisitiveness of submarine life-forms as they marvel at this strange visitor to their habitat. Taking extraordinary pictures necessitates a deep understanding of the animals, their habits and their surroundings. Careful planning, comprehensive knowledge about flora and fauna, and a good understanding of weather conditions, currents, and geographical peculiarities, however, can never hide the fact that sometimes sheer luck is all that you need. And lucky I was indeed back in Alaska when I did a once-in-a-lifetime shot of a giant moon jelly. All I was actually looking for along the shores of a deep fjord was a grizzly bear hunting for salmon. But no bear was in sight and reluctantly I turned my attention to the sea, looking for a humpback whale or orca. I assigned the strange, whitish smudges I saw in the water to pollution and was about to call it a day. Yet, gut instinct made me put on my dry suit, ready my camera gear and dive into the water. In short, I encountered the vastest number of densely packed moon jellies I had ever seen. The picture of one moon jelly singled out against the backdrop of myriads of other moon jellies is still one of my all-time favorite shots.

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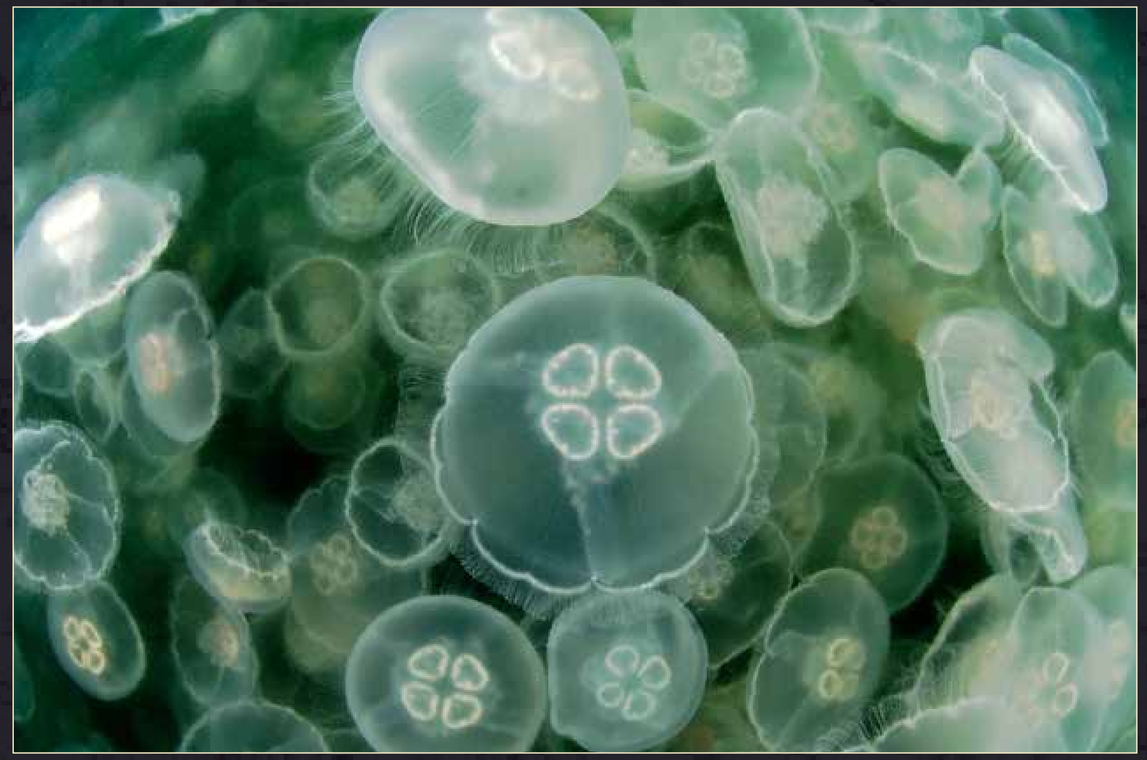

» **SMUDGES** «
Alaska/USA 2009
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» **MOON JELLY** «
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» WHITE NOSE «
Alaska/USA 2013
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» BLUE ICE «
Antarctica 2010
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