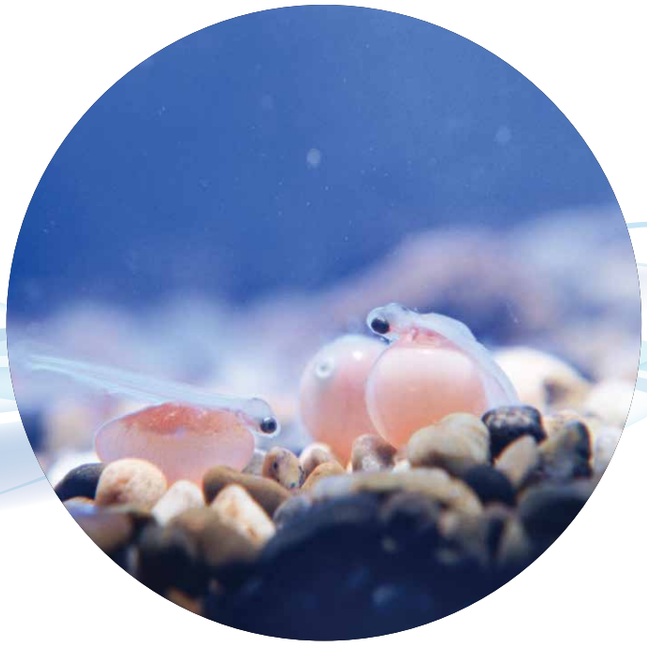
NBF Nippon Barrier Free

The Science of Salmon™

Nippon Barrier Free Co., Ltd.

Bringing Health and Beauty Through the Power of Salmon



■ Inquiries

Nippon Barrier Free Co., Ltd. TEL +81-3-5283-7222 FAX +81-3-5283-7221

Surugadaishita MK Bldg. 4F, 1-41, Kanda Jimbo-cho, Chiyoda-ku, Tokyo 101-0051, JAPAN

https://www.n-bf.co.jp/en/index.html

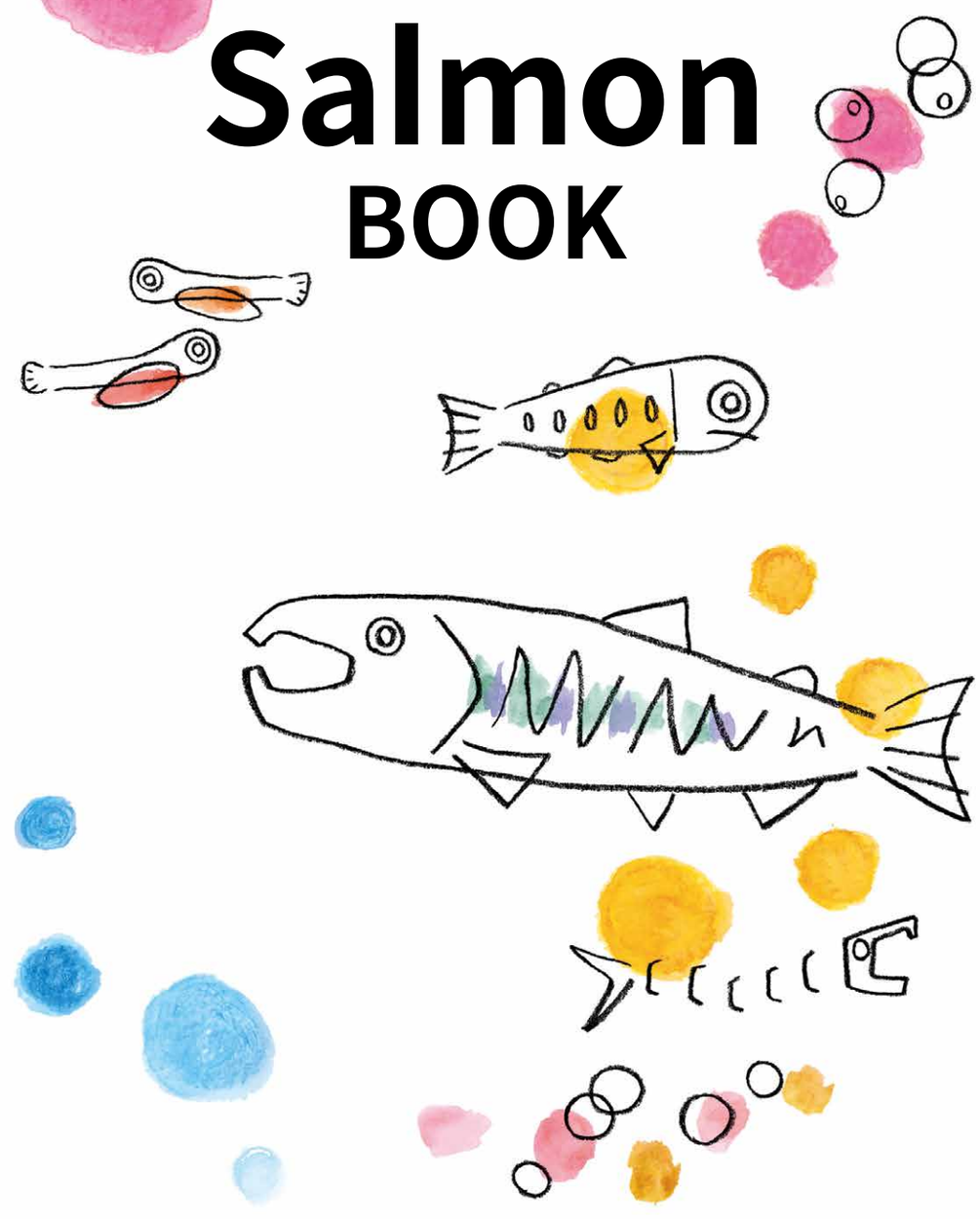
First edition 2011.9.30 Second edition 2025.5.25

【 Home page 】

The Power of Salmon BOOK

Nippon Barrier Free Co., Ltd. Surugadaishita MK Bldg. 4F, 1-41, Kanda Jimbo-cho, Chiyoda-ku, Tokyo 101-0051, JAPAN. TEL +81-3-5283-7222

The Power of Salmon BOOK



・INDEX・

A Familiar yet Profound Fish

Salmon : A Treasure Trove of Vitality

Quiz time! The most popular fish on the Japanese table is...

The classic Japanese dish, yakizake (grilled salmon)...
Sushi's most popular ingredient, ikura salmon roe...

Salmon is a versatile ingredient.

It's often used in rice balls and much more !

Salmon is not just food—
it also has incredible nutritional benefits.

It's now drawing attention
for its benefits to **health** and **beauty**.
For example...

Nutrition Consultant for the Miss Universe Pageant Recommends the Power of Salmon

The Miss Universe competition, which crowns the most beautiful woman in the world, has seen remarkable achievements by Japanese contestants in recent years. In the 2006 competition, a Japanese contestant placed second, and in 2007, another Japanese woman took first prize, becoming the second ever Japanese winner. Erica Angyal, the official nutrition consultant for Miss Universe Japan, has provided guidance to finalists regarding their nutrition. In her bestselling book, "The Diet to Become the Most Beautiful Woman in the World," she discusses the importance of food for health and beauty.

Notably, salmon is listed as one of the "20 Superfoods Effective for Anti-Aging" recommended in United States. Beauty experts and health professionals not only in the U.S. but around the world also recommend eating wild salmon as part of their dietary guidance. Salmon, which is rich in vital nutrients, is recommended not only for preventing aging and maintaining youthfulness, but also for maintaining a healthy body.

Even the world's leading beauty experts are now taking advantage of the power of salmon. It is truly a superfood that supports beauty from both inside and outside of the body.

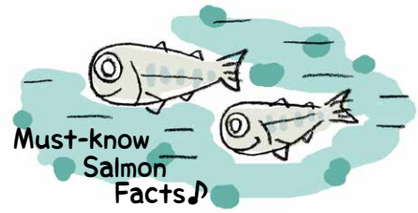
The hometown of salmon in Japan,
a natural treasure trove and pride of the whole country,
is Hokkaido Prefecture!

Shibetsu Town in East Hokkaido is famous as the homeland of salmon.

Incidentally, the town's name has its origins in the Ainu language. It means "Great River, Place of Salmon."

But wait! Salmon still have many mysterious powers that we have yet to discover!

Together, let's take a closer look the fascinating world of this mystical fish, the salmon.



The Sacred Salmon

〈 Salmon and the Japanese People: An Inseparable Partnership! 〉

Salmon is the most well-known fish among Japanese people. Every Japanese person has tasted it in some form: grilled salmon on the dinner table, salmon roe in onigiri rice balls, or as a popular high-end ingredient in sushi.

But when did the Japanese first start enjoying salmon? Our connection to salmon dates back more than 4,000 years to the Jomon period. Salmon paintings, fossilized bones, and tools and traps for salmon fishing have been excavated from shell middens (food waste heaps) and ruins dating back to the Jomon period, indicating that salmon fishing was practiced at that time. Records show that around 1300 years ago, salted salmon was paid as a tax, and it was considered an offering to the gods that was indispensable for important court ceremonies and other events. The book "Wakan Sansai Zue", written around 400 years ago, also mentions that salmon return to the river where they were born. Although long considered a precious fish, salmon became widely popular among the general public as a year-end and New Year's delicacy during the Edo period. As a fish-eating people, the Japanese consider salmon to be an inseparable part of their culture.

The history and custom of eating salmon have truly been imprinted in our genes since ancient times.

〈Why Salmon Is Known as the "Sacred Fish"〉

Hokkaido Prefecture is known as the "home of the salmon." The Ainu people in Hokkaido Prefecture call salmon "kamui chep" (sacred fish), and perform rituals before fishing, regarding salmon as a gift from the heavens. Every part of a salmon is useful, and should not be wasted. The Ainu people, who regard salmon as a "gift from the gods" use the fish for food, from the head to the tail to the internal organs, and make clothes and shoes from the leftover skin to endure Hokkaido Prefecture's harsh winters.

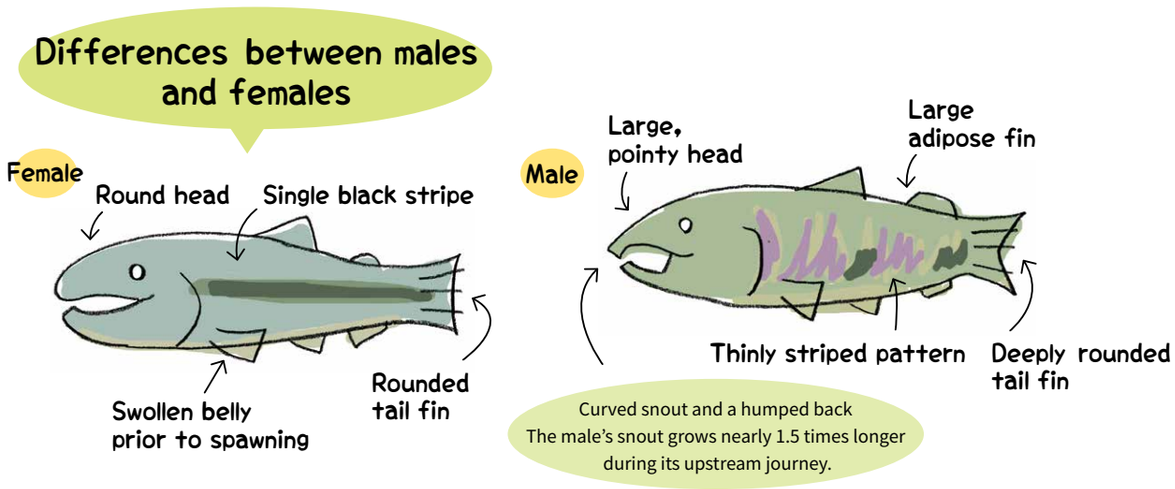
Even after all these years, salmon is much more than just a fish to the Japanese. The story of the salmon is also included in the children's book "Ninguru no Mori" (Ningle's Forest) by Sō Kuramoto, author of the TV drama "Kita no Kuni Kara" (From the North Country). Ningle, a small fairy living in the forests of Hokkaido Prefecture, is made aware of the importance of protecting nature upon seeing salmon returning to the river from the sea to spawn. Born in the river, raised in the sea, and returning to the river where they were born, salmon have always been regarded as mysterious beings coexisting with nature. The belief that the salmon is a "sacred fish" is not unique to Hokkaido Prefecture. Folktales and legends about salmon are passed down through the generations in Iwate Prefecture, Yamagata Prefecture and other prefectures. There are shrines dedicated to salmon near the rivers where they migrate upstream, and in prefectures including Iwate, Yamagata, Chiba, Ishikawa, and even in Fukuoka—far south of Hokkaido— a festival dedicated to salmon as "messengers of the sea gods" is still held annually.

The Deep and Fascinating World of Salmon

〈 Overview of Japanese Salmon 〉

According to the system of classification created by Nelson, there are 11 genera of salmonids in the world. There are many species within the common "salmon genus" including chum salmon, pink salmon, sockeye salmon and masu salmon, each of which differ in terms of seasonality, length of time to maturity and flavor. A distinctive feature of salmonids is the presence of a small "adipose fin" behind the dorsal fin. Being a vestigial fin, the adipose fin is not used for swimming. Therefore, when salmon fry are released into the river, these fins are clipped off as a marker to survey how successfully the released fry have returned to the river.

Male and female salmon are indistinguishable in their early stages, but when they leave the river for the sea and then return to the river where they were born as adults, they begin to show distinctive features in their appearance. After swimming back up its birth river, the male of a pair releases sperm into the river where the female has spawned, and some of the males that have not been fortunate enough to be paired with a female may try to mimic the females' nuptial coloration to sneak into the spawning grounds. In some cases, when another female approaches a spawning site, the original female may display male-like markings to assert dominance.

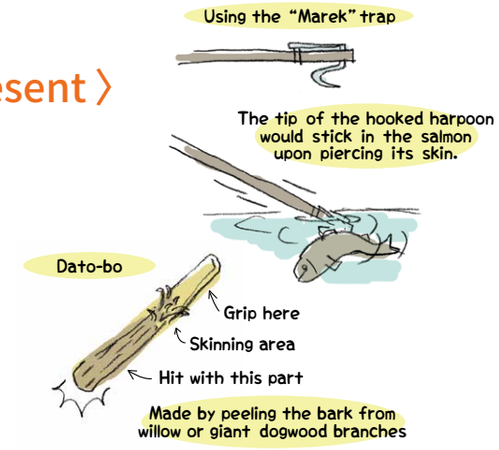


〈 Catching Salmon: Past and Present 〉

● Traditional salmon fishing in Hokkaido

【Ainu Salmon Fishing】

After spearing the salmon with a harpoon-like tool called a marek, they would strike the salmon on the head with a club called an "Dato-bo." Since salmon were considered sacred fish, using anything other than the designated club—such as branches or stones—was strictly forbidden.



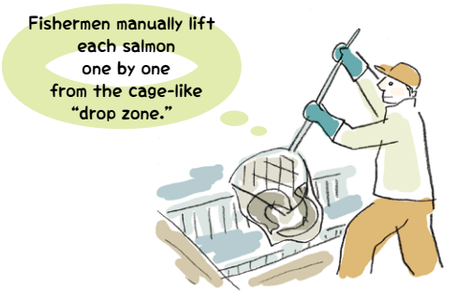
● Traditional salmon fishing in Niigata Prefecture

【"Iguri-Ami" Net Fishing】

Dating back to around 400 years, this method of fishing involves three boats working together in the river. Two boats stretch a net between them, while the third uses poles to strike the surface of the water and drive salmon into the net. This fishing method is still practiced in the Miomote River from late October to December.

【Urai Trap Fishing】

A fence spans the width of the river, guiding upstream salmon into a "drop zone" (Otoshi-saku) for capture. This method is less damaging to the salmon than catching them in nets, so the eggs are in better condition when they are collected. As in the case of the iguri-ami fishing, this method is used from October to December.



〈 Determining a Salmon's Age by Its Scales 〉

The scales of a salmon have a pattern of multiple circular lines similar to tree rings. The faster the salmon grow, the more lines appear. In winter, when there is less food, there are fewer lines and the space between them becomes narrower. These are called "winter bands" and the number of winter bands indicates how many times a salmon has gone through winter, in other words, how many years it has lived.

The age at which salmon become adults ranges from 2 to 6 years for males and 3 to 6 years for females, and the size they are at the time of their return varies widely. The smallest adult salmon are about 40 cm (600g), while the largest have been found to weigh more than 10kg.

Salmon Scales

〈 Salmon, the King of Fish 〉

What comes to mind when you hear “King of Fish”?

The writer Junichi Watanabe, in his book “Kore wo Tabenakya: Watashi no Shokumotsu-shi” (Unmissable Food: My Food History), calls salmon the “King of Fish.” The reasons for this include its magnificent appearance, its delicious meat and body that can be eaten in its entirety, and its mysterious life cycle. Since the Middle Ages, salmon has been prepared in various ways, including Sowari (salted and dried salmon; shio-hiki), Hizu (head cartilage of salmon), Sewata (salmon back intestine), Karasake (dried salmon), Kogomori (salted salmon with the roe removed from the belly of the female salmon and returned after being cured in salt), Shake-abura (salmon oil), and Nama-shiozake (fresh salted salmon). Salmon was an essential ingredient for important divine festivals, and was used food for court events as well as for wages for officials and court nobles. It is said that over 10,000 salmon were used each year in the imperial court. Salmon was even used as a form of salary, making it truly worthy of the title “King of Fish.”

〈 Salmon : The Most Consumed Fish in Japan 〉

● Most Frequently Purchased Fish (fresh fish) in Japan

No.1：Salmon
No.2：Tuna
No.3：Squid
No.4：Shrimp
No.5：Yellowtail

Salmon is number one!

*From the 2009 household survey by the Statistics Bureau of the Ministry of Internal Affairs and Communications

According to a survey on the household purchases, salmon has been the number one item purchased per household for many years! This means that salmon is the most consumed fish in Japan. Japanese people love salmon.

〈 Hokkaido Prefecture Produces About 76% of Japan’s Salmon 〉

Hokkaido Prefecture is where the most salmon—Japan’s No. 1 fish—are landed in Japan. About 170,000 tons of salmon are caught each year in Japan. Of that amount, Hokkaido Prefecture accounts for approximately 130,000 tons, an overwhelming 76% of the total salmon catch (from “Fishery and Aquaculture Production Statistics,” 2008).

Salmonids

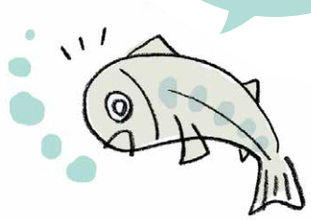
● Salmonid Classification

Salmonidae

- Oncorhynchus
  - Chum Salmon (Shirozake)
  - Pink Salmon (Karafutomasu)
  - Sockeye Salmon (Benizake)
  - Coho Salmon (Ginzake)
  - Chinook Salmon (Masunosuke)
  - Masu Salmon (Sakuramasu)
  - Rainbow Trout (Nijimasu)
- Salmo
  - Brown Trout (Buraun Torauto)
  - Atlantic Salmon (Taiseiyousake)
- Salvelinus
  - Dolly Varden (Oshorokoma)
  - Brook Trout (Kawamasu)
  - White-Spotted Char (Amemasu)
- Parahucho
  - Taimen (Itou)

The salmon we usually eat is Chum Salmon!

Chum salmon is also known as “autumn salmon” or “seasonal salmon,” depending on the season.



【 Chum Salmon 】

Generally, when people in Japan refer to salmon, they mean chum salmon (shirozake), which constitutes the majority of salmon returning to Japanese rivers and coastlines. Chum salmon mature at 2 to 6 years old, growing to 45–85 cm in length.

◆ Autumn salmon

Seasonal Period / Autumn

- **Ginke** (Silver-haired) … The spawning colors are not yet clearly visible, and it is considered to be the most fatty of all autumn salmon.
- **Mejika** … Named for the narrow space between the eyes and the tip of the snout. Not yet ready for spawning.
- **Keiji** (Juvenile Salmon) … A small, immature salmon. It is extremely rare, at one out of every 10,000 salmon, and thus commands a high price.

Autumn salmon, sometimes known as “Aki-aji” or “autumn-flavor” salmon are chum salmon that return to their birth rivers in autumn. There are various types of autumn salmon, such as “Ginke,” which are landed in the first half of the fishing season and have a beautiful silver body; “Mejika,” which are young salmon born in Honshu and caught on their return to their birth river; and “Keiji,” which are salmon that have yet to reach maturity and are known to have an exceptional taste.

〈Why are salmon sometimes called “autumn flavor” or “beech salmon”?〉

●Autumn flavor...
These salmon, caught along the coast in autumn before they swim upstream, are considered the most delicious, and this name expresses gratitude for their autumnal flavor.

●Beech...
The name is mainly used to refer to the salmon that have already swum upstream, as the rivers where the salmon run are surrounded by beech forests. It is also derived from the spawning colors that appear on the salmon’s body, which resembles the bark of a beech tree.

◆ Toki-zake (or “Toki-shirazu;”seasonal salmon)

Seasonal Period / Spring to early summer

These salmon are born in Russia, mainly in the Amur River. They are caught along the Hokkaido Prefecture coast from April to July. Being out of season and approaching maturity that year, its flesh is soft and fatty.

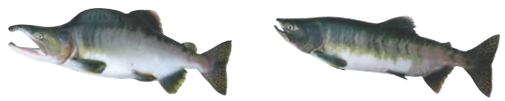
Other Members of the Salmon Family

Before descending to the sea, the salmon are known as yamame
【Masu Salmon (Sakuramasu)】

They spawn from September to October and return to the river in one year. In Hokkaido Prefecture, they are often caught from winter to spring in the south and along the coast of the Sea of Japan. “Yamame” also refers to those that do not return to the sea and rather spend their entire lives in rivers, as well as juvenile masu salmon before their migration to the sea.

Also used for processed products, etc
【Pink Salmon (Karafutomasu)】

These members of the salmon family are used in canned goods and other processed products. They are the best adapted to ocean life of all members of the salmon genus, and are found in abundance. In Japan, they migrate upstream in the coastal areas of the Sea of Okhotsk and the Nemuro Strait, and are caught from early summer to early autumn. Their lifespan is about two years.



Aquaculture is flourishing in Japan and overseas
【Coho Salmon (Ginzake)】

In Japan, these salmon are mainly farmed by means of marine aquaculture, especially in the Sanriku Region. They have a beautiful silvery-white body with a blue back. The season for domestically produced salmon runs from spring to summer. Because of its high fat content and firm flesh, it is sometimes used for canning and smoked salmon.

Bright red during spawning season
【Sockeye Salmon (Benizake)】

Widely distributed in the North Pacific, these salmon are currently the focus of efforts in Japan towards artificial hatching and release. They have the reddest flesh of all salmon, and their body turns a vibrant red during the spawning season. They mature in 3–5 years, growing 30–70 cm in length. Those that remain in lakes instead of migrating to the sea are referred to as “Hime-masu,” or Sockeye salmon.

〈 A Small “Yamame” Is a Once-in-a-Lifetime Experience! 〉

It may surprise you to learn that “Yamame” , a river fish that lives in clear streams, and the “Sakuramasu” are originally the same fish (Masu salmon) . However, understanding the relationship between “Yamame” and “Sakuramasu” can explain why salmon started going to the sea.

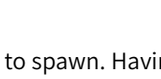
“Yamame” tend to swim in groups, forming lines in descending order of body size. The stronger males at the front can eat the insects that flow by, growing quickly, while the smaller males and females struggle to find food and survive. To survive, smaller “Yamame” take a gamble—they leave the river in search of food in the unknown ocean. The ocean, though full of predators not found in rivers, offers an abundance of food.

In spring, one year after leaving for the sea, “Yamame” salmon transform into “Sakuramasu” and return to the river to spawn. Having changed their appearance and habits to adapt to the saltwater, they are now visibly much larger than “Yamame” and can compete with them. After spawning in their birth river, their short lives come to an end.

Many salmon migrate downstream to the sea for the same reason as do “Sakuramasu”. Long ago, the ancestors of the salmon lived in rivers, lakes, and other freshwater habitats, but an ice age that occurred two million years ago caused fresh and salt water to mix, leading to the emergence of salmon adapted to salt water. Therefore, salmon spent their early years in safe rivers, and they began to travel to the sea in search of abundant food in order to grow.

Kōbō Daishi and the Salmon

From “Folktales and Legends of Iwate”



Once upon a time, there was a village where many salmon were caught. One day, a traveling monk passed by and said “Could you spare some salmon?” However, seeing his shabby appearance, the villagers refused rudely and pushed him around. The monk became angry, picked up a stone from the river, and left. Another time, on a cold night, the traveling monk arrived at a village where no salmon were caught. The villagers, feeling sorry for the monk who had no place to stay, invited him to their houses and looked after him as best they could. The monk was so pleased that as he departed he gave the villagers the stone he had picked up previously. The villagers, thinking, “What? Just a stone?” threw it into the river. But when spring came around, countless beautiful salmon started to rise in the river, where none had been found before. The village elder, wondering why, went to pay his respects. At that very moment, the traveling monk appeared and said, “I am Kōbō Daishi. This is the power of a stone that I picked up from a village where many salmon are caught. I thank you for your kindness.” From then on, the village thrived thanks to the salmon, while the village where salmon were supposed to be caught never saw another salmon again.

Let’s Go to the “Museum” to Learn About the Ecology of Salmon, the Mysterious Fish!

*As of January 2025

● Chitose Aquarium, the Home Town of Salmon (Chitose City)

【Home Page】

The aquarium is located on the banks of the Chitose River, which is known for its salmon runs. The underwater observation room in the basement allows visitors to view river life through glass. The aquarium has large and small tanks, including Japan’s largest freshwater tank. In autumn, you can see the indian water wheel used to catch salmon in the Chitose River up close.

DATA

- +81・123・42・3001
- 2-312 Hanazono, Chitose City, Hokkaido Prefecture
- Approximately 15 minutes by car from New Chitose Airport
- 9:00 a.m. - 5:00 p.m./Closed：Year-end and New Year holidays
- Adults 800 yen, high school students 500 yen, elementary/junior high school students 300 yen, infants free, group (10 or more) discounts available.

● Sapporo Salmon Museum (Sapporo City)

【Home Page】

The aquarium is located in Makomanai Prefectural Park with Toyohira River and its tributary Makomanai River flowing nearby. The aquarium is divided into a main building, a fish building, and an outdoor pond. The main building has an exhibition hall on salmon ecology and a breeding room where visitors can see juvenile salmon of different species. In the outdoor pond, salmon spawning behavior can be seen in the autumn.

DATA

- +81・11・582・7555
- 2-1 Makomanai Park, Minami-ku, Sapporo City, Hokkaido Prefecture
- Approximately 25 minutes by car from central Sapporo City
- 9:15 a.m. - 4:45 p.m./Closed: Mondays, December 29 – January 3
  *When a national holiday falls on Monday, the museum will be open on Monday and closed the following business day.
- Free of charge

● Shibetsu Salmon Science Museum (Shibetsu Town)

【Home Page】

This salmon aquarium exhibits about 30 species of salmonids from around the world, the largest number of salmon species to be found anywhere in Japan. The “fishway tank,” which has different exhibits according to the season, displays a group of juvenile salmon swimming in groups, a dynamic upstream migration in September and October, and impressive spawning behavior in November. The sturgeon “finger-nibbling” experience is also popular.

DATA

- +81・153・82・1141
- 1-1-1, Kita 1-jo Nishi 6-chome, Shibetsu-cho, Hokkaido Prefecture
- Approximately 20 minutes drive from Nakashibetsu Airport
- 9:30 - 17:00 (Admission until 16:30)/Closed: Wednesdays from February to April and November (or the following day if the Wednesday is a national holiday), December to January (open all year from May to October)
- General admission: 650 yen, elementary/junior high school students: 200 yen, group discounts and annual passes available

〈 Shrines and Temples in Japan With a Connection to Salmon 〉

- Iwate Prefecture：“Gassan Shrine”, “Kurosaki Shrine”
- Yamagata Prefecture：“Juhachiya Kannon Hall”, “Amida Temple”, “Gosho Shrine”, “Dainichi Hall”
- Chiba Prefecture：“Yamakura Shrine”, “Kanpukuji Temple”
- Ishikawa Prefecture：“Karazakenomiya Shrine”
- Kyoto Prefecture：“Okawa Shrine / Nonomiya Shrine”
- Fukuoka Prefecture：“Sake Shrine”

Now You're a Salmon Expert!

Mysteries of Salmon: Q&A

Q1. Where are salmon born?

❶ In the ocean near a river ❷ Between the sea and a river ❸ The bed of a clean river

The answer is...

❸The bed of a clean river. Parent salmon return to the river where they were born, find a spot where clean water wells up from the riverbed, and dig a hole with their bodies to lay eggs.

For details on salmon spawning, check p.13!

Q2. How long does a salmon live?

❶ About 1 to 3 years ❷ About 4 to 7 years ❸ About 8 to 10 years

The answer is...

❷"About 4–7 years" Salmon hatch from eggs in the river and gradually move closer to the ocean. After migrating through the ocean for 3-5 years, they return to the river where they were born.

For details on the life cycle of salmon, check p.14 and p.21-22!

Q3. What is the difference between sujiko and ikura types of salmon roe?

❶ They come from different species of salmon
❷ The salmon is caught at a different time of year
❸ The presence or absence of a membrane encasing the eggs

The answer is...

❸The presence or absence of membrane encasing the eggs. With ikura salmon roe, the eggs are separated one by one, but with sujiko, the eggs are wrapped in a membrane. This is the "ovary membrane" used to nurture the eggs.

For details on the ovary membrane, check p.15–16!

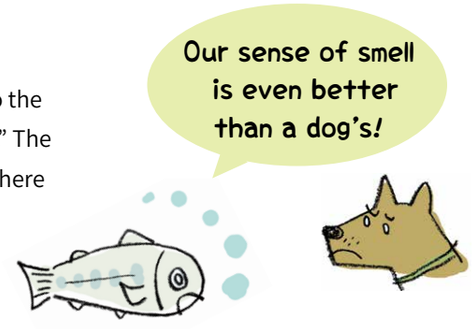
Q4. Why can salmon return to the river where they were born?

❶ Because they remember the smell ❷ Because their family lives there
❸ Because there are still landmarks leading there

The answer is...

❶Because they remember the smell. The return of salmon to the river where they were born is known as the "homing instinct." The leading theory is that they remember the smell of the river where they grew up.

For details on the homing instinct, check p.22!



Q5. What percentage of salmon return to their home river?

❶ 25% of the total ❷ 7% of the total ❸ 3% of the total

The answer is...

❷7%. As they travel from the river to the sea, juvenile salmon face many predators, such as other fish like sculpins and birds like kingfishers. Even if over a billion salmon began the journey, only about 70 million would return.

For details, check p.21!

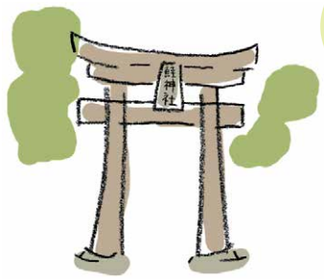
Q6. What is the southern limit of salmon in Japan?

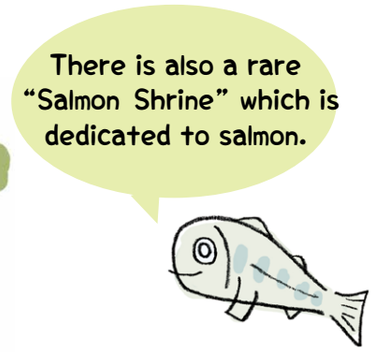
❶ Fukuoka Prefecture ❷ Tottori Prefecture ❸ Niigata Prefecture

The answer is...

❶Fukuoka Prefecture. On the Pacific side, the southern limit is around the Kanto region, but on the Japan Sea side, the southern limit is in Kama City, located in the Onga River basin of Fukuoka Prefecture. Salmon were known to swim up this river until around 100 years ago.

For details, check p.23!





How many did you get right? From the next page, we'll dive deeper into the life cycle of salmon!

Salmon Roe (Ikura) Chapter

〈A Salmon Lays Approximately 3,000 Eggs at a Time〉

Salmon return to the river where they were born to lay their eggs. Salmon prefer cool, clean water. When male and female salmon return to their native river to spawn, they swim upstream to find a place to lay eggs, and when they find a spot where water is welling up from the river bottom, they dig a hole with their bodies to create a “spawning bed.” Spawning beds are made in shallow water about 30 cm deep, and having a spring water nearby is also important. When there is a spring water nearby, the water does not freeze even in cold winters, and both the water temperature and the amount of oxygen are kept at a constant level, making it easier for the eggs to develop. Once the mother salmon has chosen a spot, she uses her tail fin to shift the gravel aside and dig a hole that measures about 1 meter in diameter and 30-50 cm deep. After creating a large circular depression, she digs a smaller hole in the middle in which to lay her eggs. This hard work is done solely by the female. What a powerful mother!

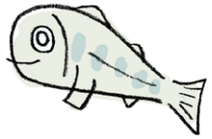
Salmon spawn only once in their lifetime, but they lay their eggs in multiple places as they are easily targeted by predators if they are all in one place. It is hard for the mother, laden with eggs, to perform the hard labor of digging holes, even if it is with the aim of leaving behind offspring. She creates four to five spawning beds and lays 2,000 to 3,000 eggs in each. Each spawning takes 7 to 20 seconds, and after protecting the last spawning bed for 1 week to 10 days, the mother finally succumbs to exhaustion.

Every part of a salmon’s life has a purpose, from the moment they are born until they die after spawning. From the time they are eggs to when they become fry, salmon face many predators, including birds such as kingfishers and crows, other fish, sea lions and seals in the ocean. They also face bears as they migrate upstream, but all are part of the natural food chain. And after spawning, the dead parent salmon become nutrients that allow plankton in the water to grow, which in turn provides food for the fry.

Salmon also help forests to grow. Studies have shown that trees grow faster in forests around rivers where salmon migrate upstream than in regular forests. Bears often leave remnants of the salmon they catch in the forest, and these are eaten by other bears and other animals. The nutrients in the animals’ waste and a type of nitrogen (N15) otherwise not found in the forest that comes from the dead salmon contribute to the growth of trees, plants, and flowers. In this way, the salmon’s life is intricately woven into Earth’s ecological cycle.

Salmon eggs sit in shallows that do not freeze in winter. Here, they are hidden from predators and wait patiently for the day when they will be able to emerge.

The Life of a Salmon



Females dig holes in the gravel on riverbeds and pair up with males, which release sperm after the females have spawned. Females spawn several times in different locations and die while protecting their eggs.

Spawning
September to January

Fertilization and Eye Development
October to March

Eggs laid on spawning beds are nurtured beneath the gravel while being bathed in clean spring water. The eyes begin to develop after about 30 days at a water temperature of 8°C.

About 30 days after their eyes develop, the baby salmon hatch from the egg membrane. They remain quietly under the gravel, still attached to their yolk sac, which provides nutrition.

Hatching
December to April

Juvenile Salmon
February to May

After about 60 days, the 3- to 4-cm-long fry emerge from the gravel and begin to swim. They feed on aquatic insects such as non-biting midges (Chironomidae), grow large, and gradually make their way to the mouth of the river.

*Here, they are targeted by predators such as kingfishers!

Seaward Migration
March to July

They travel to the North Pacific Ocean in search of its abundant food. They feed on krill, squid, and small fish, storing nutrients and growing rapidly. They primarily swim around the Aleutian Islands.

*Here, they are targeted by sea lions, seals, large fish, and birds!

The young salmon then grow up along the coast of Japan, feeding on plankton, and move offshore after adapting to the sea water. They spend the summer in the Sea of Okhotsk.

Migration
Ocean life: 3 to 5 years

Return to the River

Salmon return to their home rivers to spawn. They grow to 60-70 cm in length, and the female’s bellies are full of eggs.

Upstream Migration
August to December

During this time, the salmon spend some time along the coast, preparing for their return to their home river. Their nuptial colors appear on their bodies. After becoming accustomed to freshwater, they swim upstream in search of spawning grounds.

*Here, they are targeted by bears and other predators!

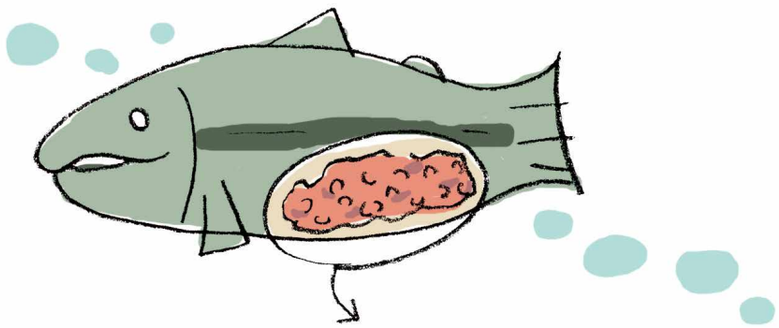
〈 Fertilized Cells Start Out as a Single Cell 〉

Each successfully fertilized egg cell is initially a single cell. How does this single cell differentiate into cells for eyes, fins, and internal organs?

In humans and mammals, the placenta plays a crucial role in promoting cell division in the baby. The placenta sends oxygen and necessary nutrients from the mother to the baby, and performs digestion and excretion while the baby's organs are developing. In humans and mammals, the placenta is essential for the healthy growth of the baby in the womb. However, fish do not have a placenta. Instead, they have an "ovary membrane."

You can clearly see the difference between sujiko and ikura sold at the supermarket: sujiko are still in their egg sac, while ikura have been removed from the sac. This egg sac is the ovary membrane. After fertilization, the salmon egg grows in the mother's belly, receiving instructions and nutrients from the ovary membrane to ensure proper cell division and development. After being laid, each salmon egg grows from a single cell to a fish with several hundred million cells.

The ovary membrane of the salmon contains many nutrients and vital components for growing eggs. Although both ikura and sujiko are salmon eggs, sujiko retain the ovary membrane and thus provide a richer variety of nutrients when eaten than ikura, which lack the membrane.



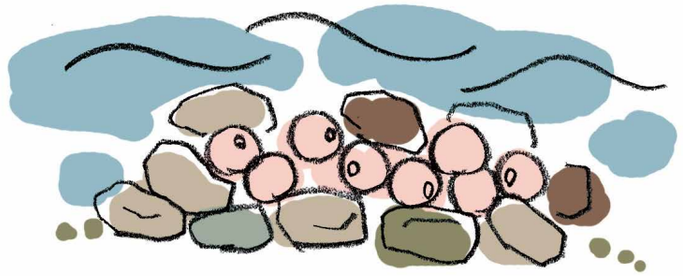
Eggs in the mother receive nutrients from the ovary membrane.

〈 Where Do the Eggs Obtain Their Nourishment? 〉

The previously-mentioned ovary membrane, which salmon have instead of a placenta, provides nutrients to the eggs until they hatch. The mother's brain sends signals to the liver to supply the nutrients needed for the development of her eggs. While sujiko have an outer ovary membrane, when spawning occurs, the eggs are released into the river as individual separate eggs, like ikura. What happens to the membrane that was covering the eggs, and when does it disappear?

In fact, the sujiko and ikura sold in stores are from immature eggs. As the eggs mature in preparation for spawning, they naturally separate from the membrane to become individual eggs. You can think of it as the eggs changing from the sujiko state to the ikura state before they are spawned.

Immediately after the eggs are spawned, the outer membrane, also known as the egg sac, is a translucent orange color, but as soon as it comes into contact with the river water, it turns cloudy white and becomes firm enough to withstand being held between the fingers without breaking. Human babies grow up in their mother's womb until they are born, but baby salmon are separated from their mothers while still in the egg state, so the egg membrane acts as a substitute for the mother's womb. Protected by the egg membrane, which is strong enough to withstand minor shocks, the baby salmon absorb nutrients from the egg and steadily build their bodies in order to hatch.



About one month after fertilization, the eyes become visible.

Baby Salmon Chapter

About 2 months after birth

〈 Hatching on a Clean Riverbed 〉

After about 30 days after being laid in a spring water with little variation in water temperature, the fry inside the eggs begin to form eyes that are colored with black pigment (ocular development). The black eyes are visible from outside the egg through the white egg membrane. As the eye outlines become clearer, you can see the fry spinning around inside the egg.

About 60 days after spawning, the fry begin to hatch. As the moment of hatching approaches, the fry in the eggs release an enzyme from between their eyes that dissolves the tough egg membrane. This enzyme causes the egg membrane to thin, allowing the baby salmon to break through the cramped shell and peek out of the egg. The newly hatched baby salmon are about 3 cm long. Their belly is covered with a large pouch (oocyst) filled with orange yolk. For this reason, the hatched baby salmon look quite different from the sleek adult salmon. With the large yolk sac still attached, the baby salmon must absorb the nutrients in the yolk and continue growing before spring approaches.

Interestingly, the number of days it takes for the eggs to hatch is closely related to the water temperature. In the case of salmon, the average daily water temperature is summed up each day, and the eggs hatch when that total reaches approximately 480 degrees Celsius. In other words, if the water temperature is 8 degrees Celsius, the eggs will hatch in 60 days, as 8 times 60 is 480. This water temperature is called the “cumulative temperature,” and seems to be almost constant in a given salmon type.

Newborn baby salmon are sensitive to ultraviolet light, so they stay in a dark, shaded areas.

〈 What’s Inside the Belly Pouch? 〉

Newly hatched baby salmon instinctively avoid bright light and seek darkness. Therefore, after hatching, they remain in the hollows of their spawning beds. They hide in spaces between rocks, and grow little by little, using the yolks in their belly pouch for nutrition that allows them to develop. Additionally, the water coming up from the bottom of the river always provides ample fresh oxygen, so the baby salmon do not have to search for food in the cold winter, but can safely grow on the spawning beds prepared by their mothers.

After about 60 days of growing under the gravel, the baby salmon reach around 4cm in length. By that time, their belly pouches have become smaller and they’ve developed tail and pectoral fins strong enough to swim on their own. Then, when the remaining yolk stores are low, they gradually begin to swim toward the light. By the time they are able to swim in groups, the nutrition in their pouches is completely depleted. However, they have grown enough by then to search for food on their own, and are able to eat plankton and other food. Baby salmon must survive on their own strength from the moment they are born, while growing from the nutrients their mother provided.

As the pouch gradually gets smaller and smaller, the color and pattern of the body become more distinct, and the baby salmon gradually come to resemble salmon as we know them.

Juvenile Salmon Chapter

About 4 months after birth

〈 Four-Month-Old Fish Growing on Aquatic Insects 〉

After surviving the cold winter, the salmon offspring become more active when the river water becomes warmer and spring arrives.
After emerging from the spawning bed, they swim in schools through rivers and marshes, searching for food. During this period, their bodies are covered with a distinctive spotted pattern characteristic of juvenile salmon that is thought to distract predators. The primary food source for juvenile salmon is aquatic insects such as mayflies and stoneflies, but they also feed on small beetles and ants that have fallen from trees as well as midge larvae.

At night, when they cannot hunt for food, they gather in quiet areas where the current is calm. But when rainfall causes strong torrents, the juvenile salmon, which are still small, can be swept away by the rushing current. Not only that, there are many enemies lurking in the river that target juvenile salmon, such as sculpin camouflaged against stones on the river bottom, char hiding behind rocks, and birds such as kingfishers and dippers.

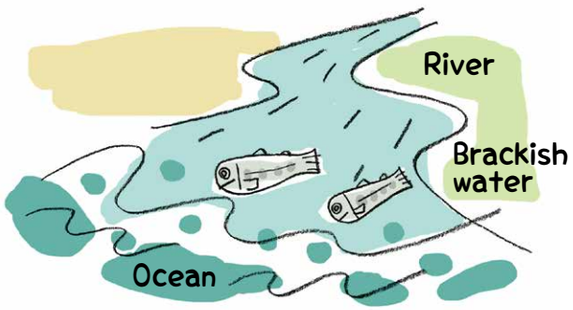
After overcoming these dangers, the young salmon gather in groups near river mouths around April or May, and begin preparing to go out to sea. They do not go out to sea immediately, but live near the mouth of the river or in the surf zone. As their bodies gradually adapt to seawater, their spotted patterns start to fade. When they have grown to about 10cm in length, they are ready to set out on their 10,000km journey across the sea!

When the spotted pattern on their bodies fades, it signals that they are ready to move from the river to a life in the sea.

〈 Why Can Salmon Survive in Both Freshwater and Saltwater? 〉

Fish are generally classified into freshwater fish and saltwater fish, and the salinity of their living environment differs greatly. Normally, fish cannot move from rivers to the ocean or vice versa. This is because the mechanism for maintaining a constant salt concentration in body fluid (blood) through osmotic pressure regulation works in completely opposite ways in freshwater and saltwater. Because the salt content of the water around freshwater fish is lower than that of their body fluid, osmotic pressure causes the salt in their bodies to be lost and water to enter their bodies, causing their cells to swell and burst. To prevent this, they replenish lost salts through special cells in their gills and excrete large amounts of dilute urine to remove excess water, while making sure to drink as little water as possible. In contrast, saltwater fish live in seawater, which is saltier than their body fluids, so these fish lose water from their bodies as the salt comes in, making their cells shrink. To counter this, they drink large amounts of seawater, excrete excess salt, and excrete concentrated urine while retaining the water. In this way, freshwater and saltwater fish regulate osmotic pressure differently in order to keep salinity levels stable within their body.

Most fish have only one of these regulatory functions, so when they move between freshwater and saltwater, their bodies are unable to adjust and they die. However, salmon can live in both environments by using their kidneys and gills to switch osmoregulatory mechanisms in the brackish water zone where freshwater and saltwater meet. While salmon have beautiful streamlined bodies in the ocean, their skin color and body shape change when they swim upstream. This is another unique trait of the salmon that is necessary for them to thrive in both freshwater and saltwater.



Part 2：The Life of a Salmon

Adult Salmon Chapter

About 5 months after birth

〈 Embarking on a 10,000km Ocean Journey 〉

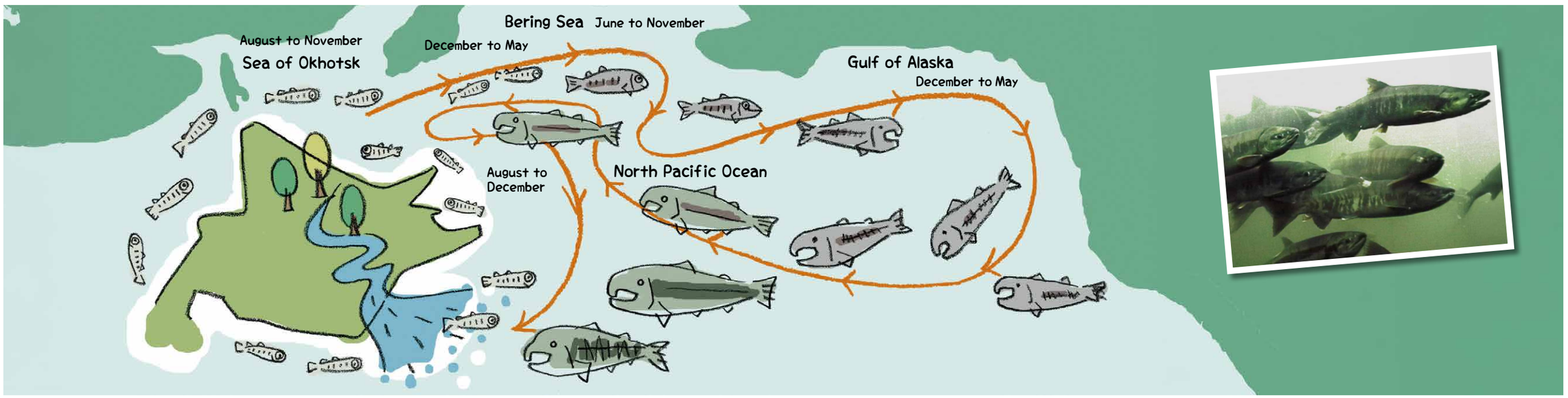
Upon reaching the ocean, juvenile salmon grow rapidly by feeding on krill, copepods, and other zooplankton. At the same time, their spotted patterns disappear, and they take on a silvery hue, resembling adult salmon. They then ride ocean currents offshore in search of abundant food, eventually reaching the Aleutian Islands. After several years in the North Pacific, they grow to 60-70cm in length, cross the Bering Sea, migrate south along the Kuril Islands, and return to the river where they were born. When they are juvenile fish that have just come from the river to the sea, they swim all over in search of food, but when they return from the sea to the river as mature adults, they head straight for the river where they were born without any hesitation.

In Japan, over 1 billion juvenile salmon are released into the wild each year, but only about 7% manage to return to their home rivers. Salmon that have spent years traveling far out to sea in their natural habitat are a precious treasure, brimming with the bounty of nature.

〈 Sniffing Out the Way Home 〉

When it is time to spawn, salmon return to the river where they were born. They do this using their “homing instinct.” Salmon originally lived in rivers, lakes, and other freshwater habitats, but during the course of their evolution, they began to venture to the sea, where food is plentiful, in order to grow. When they are about to spawn, they return to their home river, which is relatively safe and conducive to successful reproduction. So how do they know which river they were born in?

In fact, salmon can find their birth river by smell. This is said to be because the salmon remember the scent of their home river from when they used to live there during their juvenile stage. Recent research has also revealed that this scent is made up of amino acids, which are essential building blocks of the human body and are also perceived as flavors. Another astonishing fact is the timing of the salmon’s return to their home river. They return to their home river with no more than a 10-day gap from the time of year when their parents laid their eggs. There are many theories about their return to their birth river, and many mysteries remain, but the ability of salmon to return to their precise birthplace at the exactly the right time is truly a wonder of nature.



Spawning Salmon* Chapter

*Salmon that have returned to their birth river to spawn.

〈 The Southern Limit of Upstream Migration – Kitakyushu Region & Environmental Concerns〉

While Hokkaido Prefecture and the Tohoku Region are famous for salmon spawning, salmon also spawn in rivers along the Sea of Japan and the Pacific coast, from central Honshu to western Japan and Kyushu. The southern limit for spawning is said to be the Kanto Region on the Pacific Ocean side and Fukuoka Prefecture on the Sea of Japan side. The Onga River, which flows through Fukuoka Prefecture, is said to be the southernmost river where salmon migrate upstream. In the city of Kama (formerly Kaho town) on the river, there is a rare shrine dedicated to salmon, known as the Sake Shrine. Until around 100 years ago, salmon used to swim upstream to the upper reaches of this river. The local people revered them as “messengers of the gods,” believing it was forbidden to eat them. In 1978, after salmon were caught in the Onga River for the first time in 40 years, the “Salmon Revival Association” was formed and has continued to release juvenile fish.

The disappearance of salmon migrating as far south as Fukuoka Prefecture has likely been influenced, at least in part, by global warming. Salmon prefer cold water and are sensitive to rising water temperatures, and it is thought that for this reason their migratory area is shifting northward and shrinking. Currently, about half of the salmon consumed in Japan are imported, mainly from Chile. To import salmon from Chile to Japan, 0.54 grams of carbon dioxide are emitted per small piece, which is equivalent to keeping a fluorescent light on for about five hours. With the advance of global warming, the environment will undoubtedly become less hospitable for salmon. Eating domestically produced salmon is one great eco-friendly way to protect the earth.

Salmon used to migrate as far south as Kyushu. Once, salmon migrated as far south as Kyushu, but they have since disappeared from the region, likely due to climate change.

〈 Salmon are Monogamous 〉

In principle, salmon are monogamous. Some salmon form pairs in the sea near the river mouth before spawning, but since the male-to-female ratio varies in different fish schools, intense competition takes place before pairing. While salmon are in principle monogamous, many anomalies are seen, and they are similar to humans in that they also have love rivals and fight over them.

Most salmon spawn only once in their lives. After spawning, the females that have laid eggs and the males that have fertilized them typically die. For salmon, reproduction is truly a life-or-death affair. Salmon are considered a symbol of lifelong devotion as they form pairs during the spawning season and appear harmonious in their reproductive behavior. However, males do not assist females in digging spawning beds or covering the eggs to protect them. In fact, immediately after fertilizing the eggs, some males abandon the spawning site to seek out another mate. This is part of a cool-headed reproductive strategy—maximize the number of offspring produced.

While the females prepare to spawn, the males act as guards, keeping watch on their surroundings.

Before the Fall Run Is When Salmon Are in Their Most Nourished State.

Autumn salmon are often thought of as fish without fat, but their healthy bodies, having traversed the open ocean with the currents, contain just the right amount of fat and firm flesh.

Especially during the period before upstream migration and spawning, they are well nourished.

So many differences!

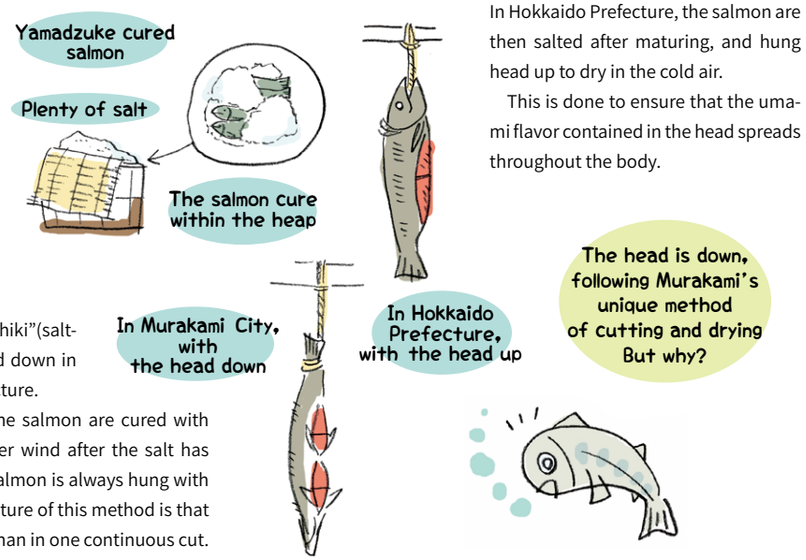
Region-Specific Salmon Trivia

Although salmon is a kind of food that is familiar to us all, the way it is eaten and the traditions surrounding it differ by region.

Let's take a look at some trivia about salmon in different regions!

Topic 1. Should Salmon Be Dried With Their Head Up or Down?

The traditional way of making salted salmon in Hokkaido Prefecture is known as "Yamadzuke" (heaped curing). Unlike regular salted salmon, this is an ancient method of curing in which salmon are heaped up in the form of a mountain with a large amount of salt and allowed to mature over a period of several days.



The traditional method of "Shio-hiki"(salt-cured salmon) has long been handed down in the Murakami region of Niigata Prefecture.

Like the yamazuke of Hokkaido, the salmon are cured with salt and then dried in the cold winter wind after the salt has been removed, but in this case, the salmon is always hung with its head down. Another important feature of this method is that the belly is split in two places rather than in one continuous cut.

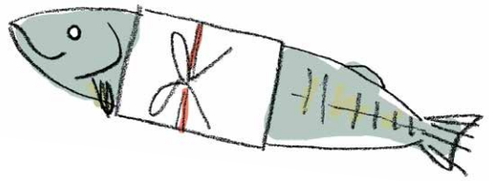
In Hokkaido Prefecture, the salmon are then salted after maturing, and hung head up to dry in the cold air.

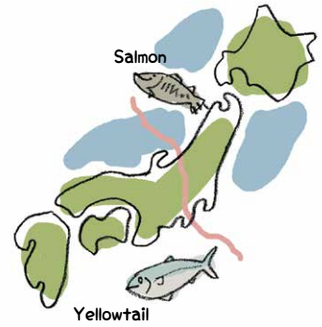
This is done to ensure that the umami flavor contained in the head spreads throughout the body.

"Yamadzuke" in Hokkaido Prefecture and "Shio-hiki" in the Murakami Region of Niigata Prefecture. Both are traditional methods of preserving salmon, handed down locally from generation to generation. While Hokkaido's yamadzuke, which is dried with the head up, is prepared primarily with the aim of enhancing flavor, the Murakami method of preparing salted salmon reflects not only the taste but also the historical background of the region. Murakami City once flourished as a castle town under the Murakami domain. The city's Miomote River, where salmon run upstream, is famous all over Japan. The reason for hanging salmon with their heads down in this region is said to be that even salmon should not hold their heads high in front of the feudal lord. The unique "Tome-bara" technique used on these salmon is said to be a result of the samurai culture of the castle town, which treated salmon as warriors and disliked the practice of seppuku (ritual suicide).

Topic 2. The Year-End Feast – Salmon or Yellowtail?

In Hokkaido Prefecture, "Aramaki-zake" is the traditional gift given at the end of the year! Broadly speaking, the eastern part of Japan, from Niigata Prefecture onwards, has a tradition of eating salmon at the end of the year.





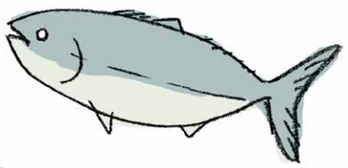
Ho, Hotaru...

Mr. Goro, in the TV series "From the North country," brought salmon to Miss Hotaru, didn't he?

Maybe I'm a little envious...

Yellowtail Has Different Names by Region

In Kanto:
Wakashi→Inada→Warasa→Buri



In Kansai:
Wakana→Hamachi→Mejiro→Buri

The name changes as the fish grows!

Meanwhile, in western Japan, "yellowtail" (Buri) is the fish usually associated with New Year's Eve.

Yellowtail is known in Japan as a fish bringing success in life. Both salmon and yellowtail are thought of as lucky fish that are indispensable for celebrations.

In Japan, as the end of the year approaches, there's a custom of giving "Oseibo" (year-end gifts) to people who helped you throughout the year. This custom originates in the offering of dried seafood to ancestral spirits, and in particular, yellowtail and salmon, which are known as "Toshi-tori-zakana," in appreciation for good fortune that year. Toshi-tori-zakana are feast foods eaten to welcome the year deity on New Year's Eve. Since people offer the best fish available in their region, toshi-tori-zakana are each area's most delicious fish. In Hokkaido Prefecture, Tohoku, and Hokuriku Region, the tradition is to gift salted Aramaki-zake, wrapped in straw, while in western Japan, from Niigata Prefecture onwards, yellowtail is the fish most associated with New Year's Eve. Although the choice of fish varies, the sentiment for a prosperous year remains the same.

Now you are the king of trivia!

Fun About Salmon: Q&A

Q1. Salmon flesh looks reddish, so is it a so-called red-fleshed fish?

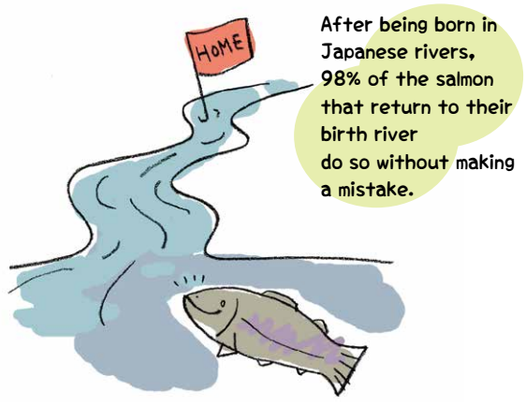
A. Salmon are in fact “white-fleshed fish.”

It is surprising that salmon, with its characteristic red flesh, is in fact classified as a “white fish.” The red color comes from astaxanthin, a red pigment. The astaxanthin derives from algae, which salmon eat by eating the larvae of shrimp and crabs that feed on the algae, and this is what gives salmon their red flesh.

Q2. When do salmon memorize the location of their home river?

A. It is said to be during their journey from the river to the ocean.

As the salmon migrate from the river to the sea, their bodies gradually turn silver. People believe that it is during this time that they start to become familiar with the smell of their birth river, and by the time they reach the ocean, they have memorized it. The juveniles learn this smell only once in their lifetime.



Q3. Is there really a book made with salmon skin?

A. Yes!

The book on salmon “Kei Son Jūen” (published in 1942), known as an important reference book among researchers, uses genuine salmon skin for the spine. Additionally, a rare special edition of “Fish On,” a book written by Takeshi Kaiko, a salmon fishing enthusiast, uses tanned salmon skin for its cover.

Q4. There is a phrase in Japanese that says: “Heike, Hokkekyo, Kombu, Sake.” What does it mean?

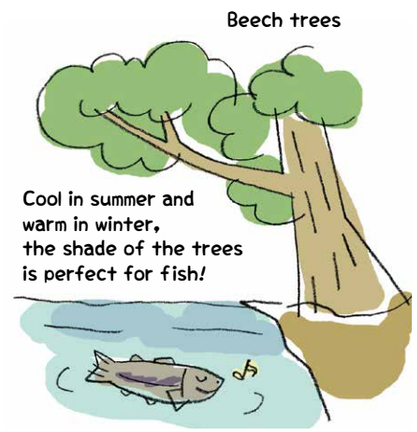
A. It essentially means “with nothing missing, and with nothing to throw away.”

It’s a reference to the Heike clan in Japan, during their time of greatest prosperity. The “sake” part actually refers to salmon, and it is clear from phrases such as these that since ancient times, salmon has been enjoyed not only for its meat, but also for its skin, innards, cartilage and other parts as an excellent food source with nothing going to waste.

Q5. What is a “Fish-Forest”?

A. As you can probably guess from the name, it is a forest providing an ideal environment for fish.

Fish, whether in the ocean or a river, prefer to live in shaded areas. In towns with a long history of fishing, it is believed that fish congregate in waters surrounded by forests, and hence there is a tradition of protecting forests on coastlines. The shade of beech trees and other trees keeps the water temperature stable and the water pristine. This creates an ideal environment for the growth of plankton and insects, which serve as food for fish. In Hokkaido Prefecture, 30,315 hectares of forests are designated as “fish-breeding forests” under the Forestry Law.



Q6. What marked the beginning of Western-Style painting in Japan?

A. It is said to be the painting “The Salmon” by Yuichi Takahashi

The painter, Yuichi Takahashi, is said to be the first Japanese painter to paint in the Western style. His masterpiece, “The Salmon,” which was used as the design for a postage stamp, is held to be the beginning of Western-Style painting in Japan. It is said that he chose a lifelike salted salmon as a motif to appeal to the appetite of the general public, who were accustomed to Japanese paintings like ukiyo-e.

Q7. Are “ikura” baby salmon?

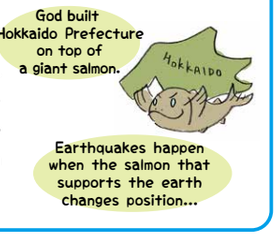
A. Ikura means “fish roe” in Russian.

It is well known that “ikura” is a Russian word. But in Russia, all fish roe, including cod roe and caviar, are called ikura. In English, all salmon varieties are known simply as “salmon,” however when salmon is sold in Japanese supermarkets, it is classified into “sake,” meaning chum salmon, coho salmon, sockeye salmon, etc., and “salmon,” meaning atlantic salmon and king salmon (chinook salmon).”

The King of Salmon 〈from “The Folktales of Yamagata〉

There is an old tale told in Yamagata Prefecture. Once upon a time, there were two large and beautiful salmon named Osuke and Kosuke. The villagers revered them as the kings of salmon, and it was decided that November 15, when the pair swam up the river, would be the day of the salmon, when no fisherman would cast his nets. However, a greedy elder thought to himself, “You can catch more fish when nobody is around,” and cast his net in the river. However, he did not catch a single fish, so he set about drinking sake, and began to doze off on a rock. When he woke up, he found himself next to a silver-haired old man and an old woman. “Who are you?” he asked. “We are the great salmon of this river,” they replied. “Beware, for you have seen us in our true form.” The elder froze. The old couple disappeared with the sound of running water, and thousands of salmon, their silver scales shining in the moonlight, climbed up the river shouting loudly: “Here come Osuke and Kosuke!” Legend has it that the elder never woke up again.

It is also said that God, in error, built the land of Hokkaido Prefecture upon a giant salmon. These legends tell us that the salmon were special to the local people.



Part 3：The Science of Salmon™

A Nutrient Treasure Trove! Salmon's Nutritional Components

Salmon Head

Nutri-ents: Taurine, Growth hormone, Vitamin B_{12}, Vitamin D, DHA, EPA

Cook-ing: Hot pots, Soups, Simmered, Grilled dishes, etc.

Salmon Meat

Nutri-ents: Astaxanthin, Amino acids, Vitamin B_{12}, Vitamin D, DHA, EPA

Cook-ing: Sashimi, Soups, Hot pots, Simmered,Grilled,Fried, Marinated dishes, etc.

Salmon Midribbone

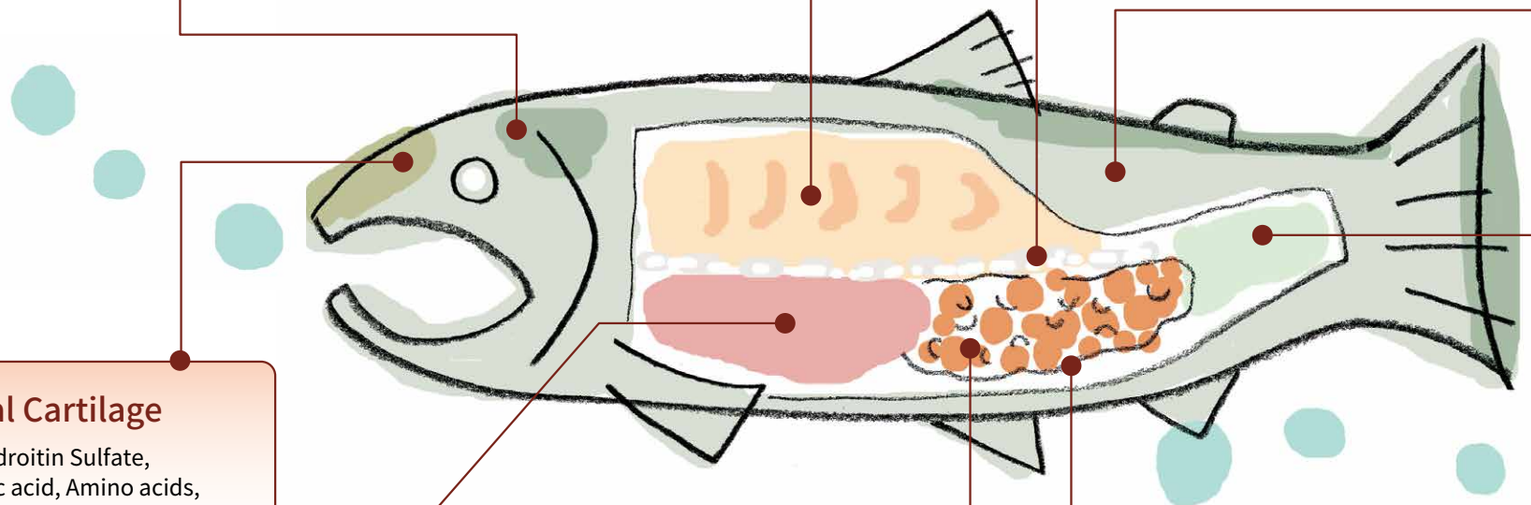
Nutri-ents: Calcium, Phosphorus, Vitamin B_{12}, Vitamin D

Cook-ing: Soup, Simmered dishes, Kombu rolls, etc.

Salmon Skin

Nutri-ents: Collagen, Vitamin B_{12}, Vitamin D

Cook-ing: Vinegar-pickles, Dressed dishes with grated radish, Ochazuke (rice in green tea), etc.



Salmon Oils

Nutri-ents: DHA, EPA, DPA

Cook-ing: Grilled dishes, Soups, etc.

Salmon Nasal Cartilage

Nutri-ents: Proteoglycan, Chondroitin Sulfate, Collagen, Hyaluronic acid, Amino acids, Calcium, Magnesium

Cook-ing: Namasu, Tataki, Rice crackers, etc.

Salmon Roe (Female)

Nutri-ents: DHA, EPA, DPA, Amino acids, Vitamin E

Cook-ing: Ikura(Salted salmon roe), Soy sauce pickles, etc.

Salmon Ovary Membrane (Female)

Nutri-ents: Amino acids, Collagen, Chondroitin sulfate, Hyaluronic acid, Nucleic acid, Elastin, B Vitamins, Taurine, Magnesium, Iron

Cook-ing: Sujiko(salted salmon roe)

Salmon Milt (Male)

Nutri-ents: Nucleic acid, Protamine, Vitamin B_{12}, Vitamin D

Cook-ing: Hot pots, Sweetened and boiled dishes, Vinegar-pickled dishes, etc.

Salmon Offal

Nutri-ents: Amino acids, Elastin, Lactic acid bacteria, Vitamin B_{12}, Vitamin D

Cook-ing: Salted fish dishes（kidney, stomach）Grilled dishes（heart, liver）, etc.

〈 Salmon - A Treasure Trove of Nutrients 〉

Over time, Japanese dietary habits have changed dramatically. As people can now access whatever they want to eat, trends have shifted from a fish-centered diet to a high-calorie, meat-centered diet. Some of you may have noticed a little extra weight around your middle of late. Salmon is an excellent way to maintain the nutritional balance that tends to be disrupted in modern life.

Protein is vital for building our bodies. And amino acids are the building blocks of this protein. The human body is made up of 20 types of amino acid, but among them, 9 types of “essential amino acids” (10 types including arginine for children) cannot be produced in the body despite being necessary for life. According to the Amino Acid Score, a scientific evaluation of the nutritional value of food proteins, salmon scores a perfect 100, making it an outstanding high-protein food! It’s also healthy, with just half the calories of beef. As well as the health-giving elements in salmon flesh, there is also collagen in salmon skin, chondroitin-containing cartilage in the head, and various other nutrients that are beneficial for health and beauty. From head to tail, salmon is truly a treasure trove of nutrition.

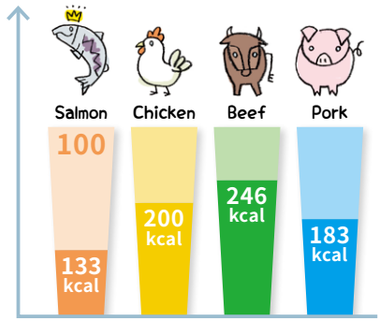
The 9 Essential Amino Acids That Cannot Be Made by the Body

- Isoleucine
- Leucine
- Lysine
- Methionine
- Phenylalanine
- Threonine
- Tryptophan
- Valine
- Histidine

■ What Is the Amino Acid Score?

It is a score of the amount and balance of essential amino acids in foods. Foods with an amino acid score of 100 contain all of the essential amino acids in an optimal balance. Like salmon, chicken, beef, and pork also receive 100 on the Amino Acid Score, but as shown in the graph on the right, salmon has the lowest calorie content.

■ Amino Acid Score



*Calories are per 100g
For meats other than salmon, thigh meat is used.

〈 Delicious and Safe Natural Salmon From Japan 〉

When it comes to famous dishes made with salmon, Hokkaido Prefecture’s “Ishikari Nabe” and “Chanchan Yaki” are well-known, but there are many other ways to enjoy different parts of the fish. While locals are familiar with these home-cooked tastes, there are some cooking methods that may seem a bit unusual to the uninitiated.

For example, there is “Hizu Namasu”, a dish served alongside New Year’s Osechi cuisine. This dish is popular in Hokkaido Prefecture, Aomori Prefecture, Iwate Prefecture, Niigata Prefecture, and elsewhere, and is made by slicing the head of a salmon into thin slices and pickling in vinegar. It is a local delicacy that has the delightful texture of crunchy cartilage. Salted kidneys—“Mefun”—are a rare delicacy that has been handed down from generation to generation. Salmon milt is boiled and served in soup. In Hokkaido Prefecture, a remnant of Ainu cooking methods lives on in the commonly eaten dish “Ruibe,” in which salmon is frozen, partially thawed, and eaten as sashimi.

Today, imported salmon accounts for nearly as much as salmon caught in Japan, but natural domestic salmon is safer, with fewer concerns about antibiotics, pesticide residues, PCBs (polychlorinated biphenyls), heavy metals, and dioxins. While of course delicious, the safety of Japanese salmon provides its greatest appeal.

Representative Salmon Dishes from Tohoku and Hokuriku Region

- **“Salmon Marinated in Sake” (Niigata Prefecture)**
  A local dish from the Murakami region. Salt-dried salmon from the Miomote River, dried in the shade until summer, is sliced finely and served with regular sake and sweet cooking sake.
- **“Noppei Soup” (Niigata Prefecture)**
  A soy sauce-based soup containing salmon, chicken, taro and other root vegetables. A beloved home-cooked dish, it is also prepared during annual events such as New Year and Obon.
- **“Harako Rice” (Miyagi Prefecture)**
  This dish is made by cooking rice with flaked grilled salmon and topping it with ikura salmon roe. Harako rice is a specialty of Miyagi Prefecture and is also served as a bento lunch box at Sendai Station. Harako in this case refers to ikura salmon roe.

Representative Salmon Dishes From Hokkaido Prefecture


“Hizu Namasu” is a vinegar-pickled dish of thinly sliced cartilage from the head of a salmon.


“Ishikari Nabe”, a miso-based hot pot, is the most popular nabe in Hokkaido Prefecture.


“Ruibe” means ‘melting food’ in Ainu language.

Part 3：The Science of Salmon™

The History of Salmon-Derived Functional Material Development at Nippon Barrier-Free Co., Ltd.

2000

2002
Marine Chondroitin™
Health Food Ingredients

2002
Marine Chondroitin™
Cosmetic Ingredients

2006
Marine Placenta®
Health Food Ingredients

2008
Marine Placenta®
Cosmetic Ingredients

2010

2016
Marine Proteoglycan™
Health Food Ingredients

2016
Marine Apatite™
Cosmetic Ingredients

2017
Marine Placenta®
Quasi-drug Ingredients

2019
Marine Lactic Acid Bacteria™
Health Food Ingredients

2020

2021
Marine DNA Peptide™
Health Food Ingredients

NEXT…

Marine Heart Peptide™
Health Food Ingredients

Marine Apatite™
Health Food Ingredients

Marine Lactic Acid Bacteria™
Cosmetic Ingredients