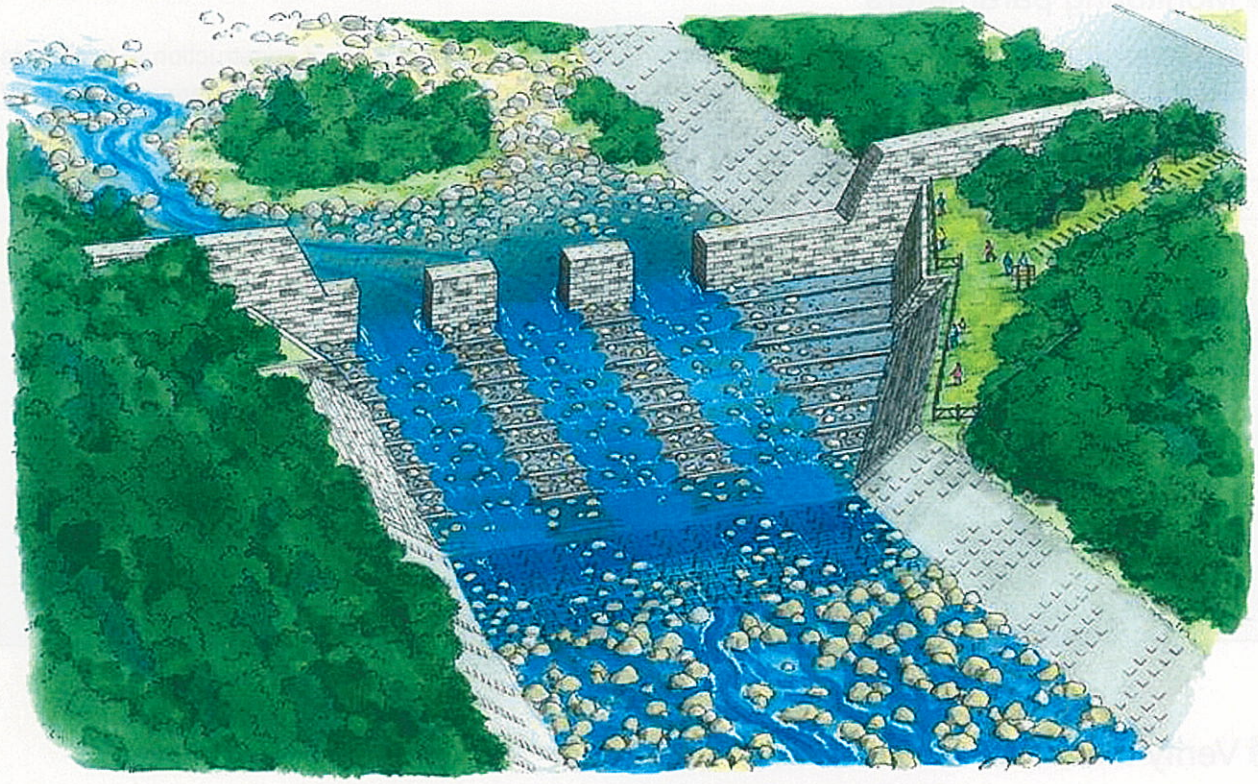
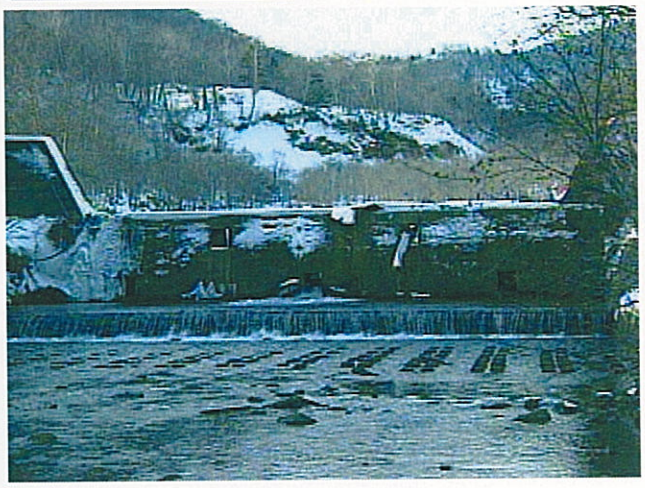
Modification Design

The Working Group assessment concluded that it would be reasonable to modify one of the check dams maintained by Hokkaido Government to allow salmon migration and also to renovate the aging river construction. This check dam is due to be modified after fiscal year 2008.

Image after Modification



Current Status



Design Features

An elevation barrier to salmonid movement will be removed by cutting slits on the bulkhead and constructing a fishway extending the entire channel width. At the upstream entrance, the channel-crossing fishway will be cut down to create small openings, each located in the direct downstream of each slit on the bulkhead. The combination of the multiple slits and the openings prevent the entire channel from being buried by sediment. All these design measures are intended to make salmonid movement as easy as possible.

Implementation of monitoring

Purpose

After river constructions were improved, monitoring (i.e., follow-up survey) has been conducted to determine whether or not those modification facilitated salmonid upstream migration.

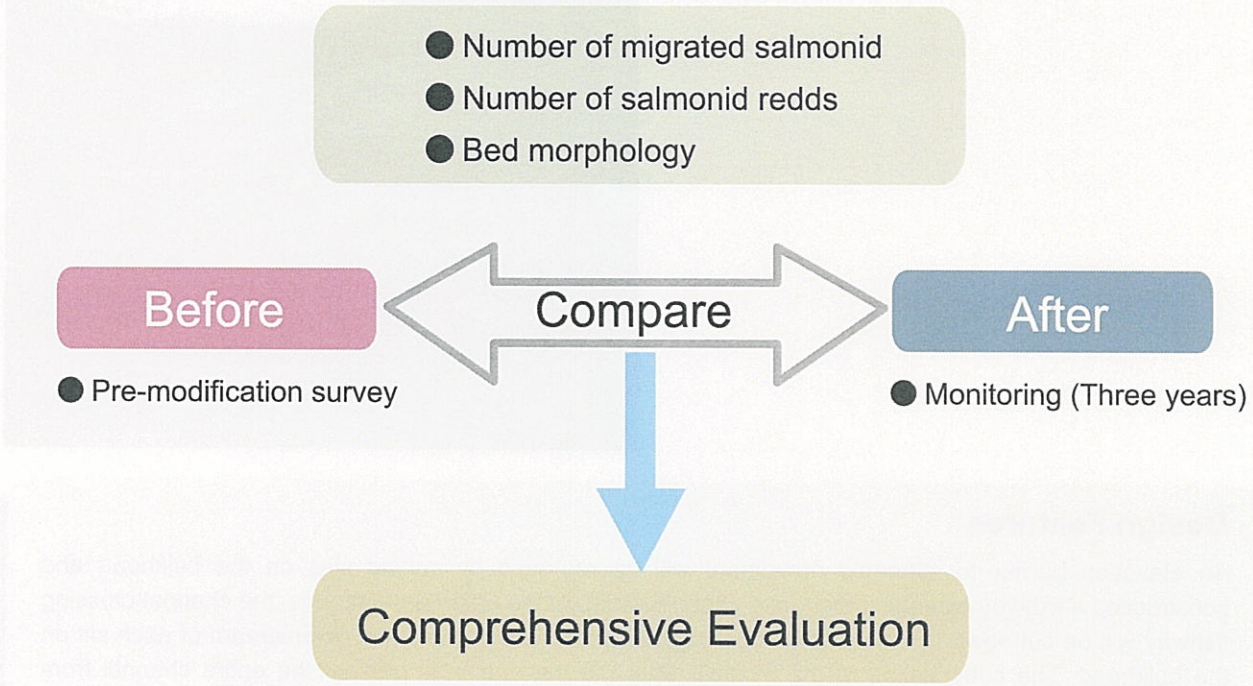
Monitoring parameters

Monitoring will be conducted over consecutive three years starting in the year of construction to two years after the construction. The effectiveness of dam modification will be examined by comparing the state of salmonid migration and spawning activity before modification with that after modification.

Monitoring objective	Measurement	Factors to be compared
Determine changes in salmonid passage rate	Upstream passage count	Number of salmonid migrated past the dam
Determine changes in salmonid spawning activity	Redd count	Number of salmonid redds
Determine changes in streambed morphology	Channel morphology	Channel length and width near the modified dam
	Substrate composition	Size and proportion of different substrate materials
	Current velocity	Velocity in the upstream and downstream of and on the modified dam
	Discharge	Discharge at the river mouth
	Fixed point photograph	Surrounding environment

Verify the effectiveness of modification

The effectiveness of river construction modification will be verified based on the monitoring data.



Monitoring results to date

Monitoring in Rusha River

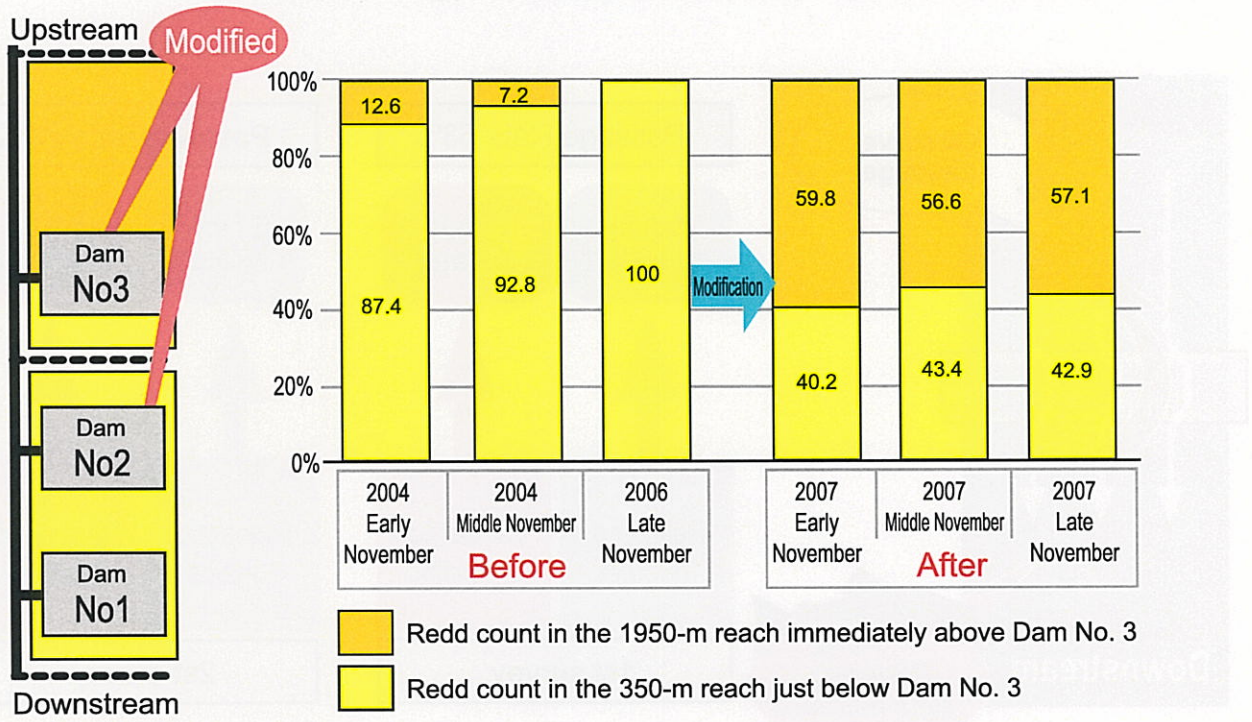
Monitoring has been carried out for two check dams (administrative agency : Hokkaido Government) modified in 2006.

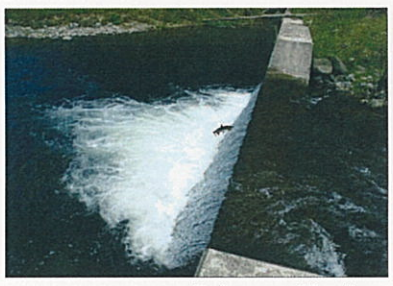
● Monitoring method - counting migrating adults and redds

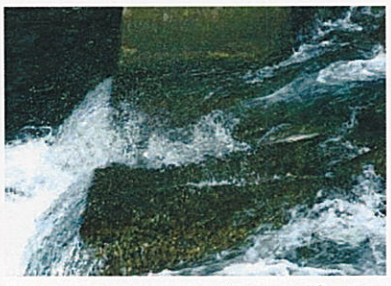
Salmonid fish returning from the ocean as well as their redds were counted near the two modified check dams, in the reach between them and near another check dam located downstream of these modified dams.

● Monitoring results

When compared the redd count for chum salmon before modification with that after modification, the percentage of redds located in the upstream of the most upstream dam (Dam No. 3) increased after modification. This shows that dam modification facilitated the upstream movement of the salmonid.




Before modification


After modification


Environment near chum salmon reeds beds

Monitoring in Iwaubetsu River

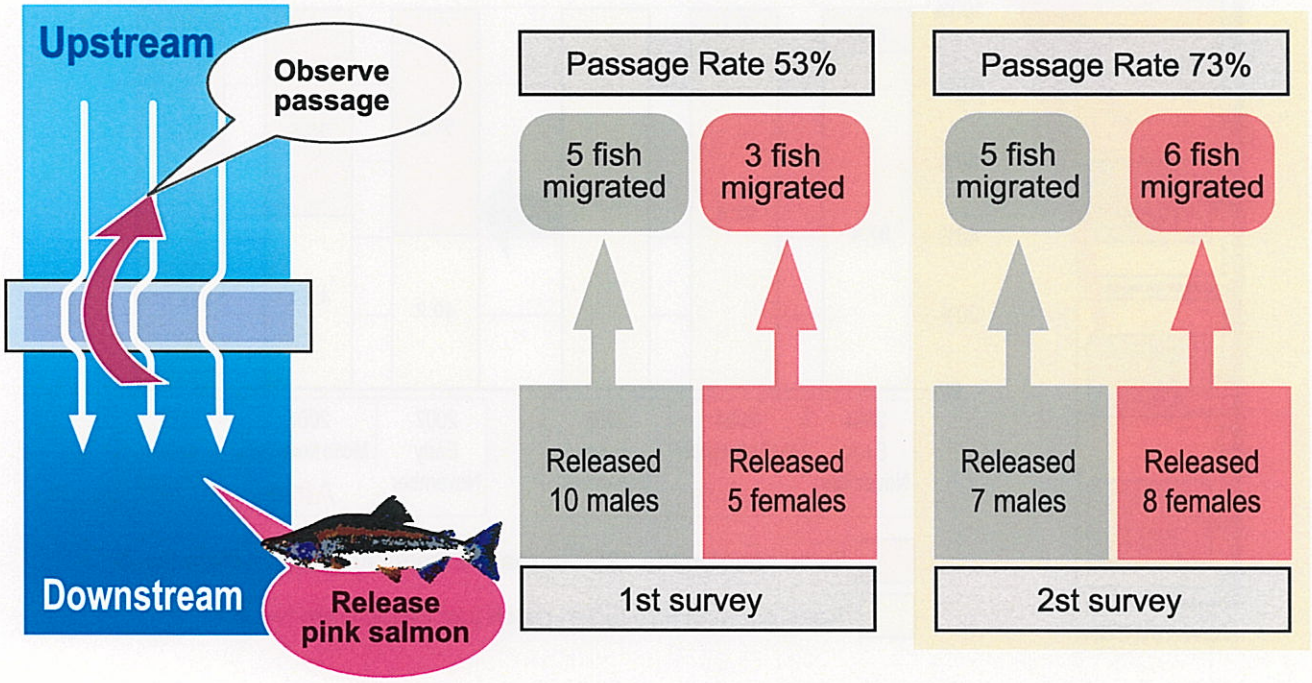
In September 2007, monitoring survey was carried out for the check dam (administrative agency: Hokkaido Regional Forest Office) modified in 2006 in the tributary Akai River.

Monitoring method - upstream passage count

There is a river construction planned for modification in the downstream. In the first year, pink salmon were released in the downstream of the modified check dam, and their upstream migration over the dam was observed. In this survey, a pair of breeding salmon were released in the upstream of the dam so that their pheromones would attract individuals in the downstream to the upstream.

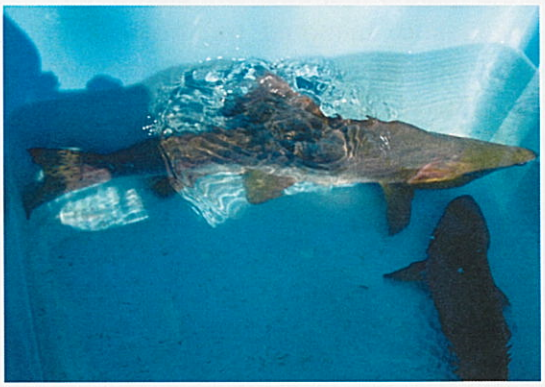
Monitoring results

The fish passage study confirmed 8 out of 15 fish released (53%) and 11 out of 15 fish released (73%) migrated past the dam in the first and second trials, respectively. The number of migrated fish varied depending on stream discharge. However, the outcomes were generally successful.

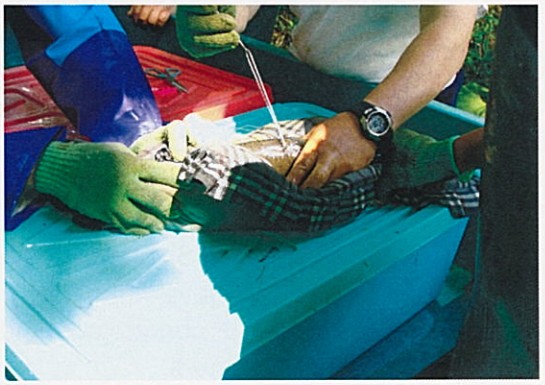


Channel length and width, substrate composition, water level and velocity were measured to determine changes in stream morphology, and photographs were taken at a fixed point.

Flow of the fish passage study in Iwaubetsu River



1 Prepare pink salmon for experimental release.



2 Tag the fish.

3 Place a net to prevent fish from swimming downstream.

4 Release the fish.

5 Observe the migration of the released fish past the modified dam.

6 Observe further upstream migration of the fish in the upstream of the dam.

Concluding Remarks

The IUCN conducted a field evaluation in July 2004, and a decision was made in July 2005 at the 29th World Heritage Committee in Durban, Republic of South Africa to inscribe Shiretoko on the World Natural Heritage List. However, the conditions for the registration were to develop the marine management plan and to modify or remove river constructions for facilitating salmonid migration. The Shiretoko World Natural Heritage Site Scientific Council initiated discussions on how to address the above issues and organized the Marine Area Working Group, the Sika Deer Working Group and the River Construction Working Group. This booklet describes the actions taken by the River Construction Working Group to date. The River Construction Working Group consists of experts, including members of the Scientific Council, local governments managing the structures and the national government agencies concerned. The Working Group held 12 meetings and conducted field surveys by January 2008 and reaped various benefits from them.

Initially, discussions were made on dam removal by the Scientific Council and through the media, and opinions were subsequently diverged into two clearly opposing viewpoints, 'remove or not'. I felt apprehensive that we might not be able to move into concrete remedial measures. I expressed my standpoint as the chairperson of the River Construction Working Group; dam removal is not feasible as long as there are human lives and properties protected by them. I made my point clear in and around the Scientific Council that dam modification is the immediate issue in the short term. Instead of being frustrated by the argument on dam removal, we endeavored to take a step forward on practical actions by implementing dam modification to improve salmon migration and restore ecosystem connectivity even if partly.

As described in this booklet, after repeated discussions by the group members and parties concerned, we succeeded in restoring salmonid upstream run and extending their habitat upstream-ward past some of the dams while preserving their disaster prevention functions. This progress was highly evaluated by the IUCN field mission team which visited Shiretoko in February 2008. We will seek for the future dimensions by evaluating the effectiveness of the remedial actions and technical issues through monitoring physical and ecological conditions of the rivers.

Modification of other dams or their removal is extremely difficult due to their disaster prevention functions. However, such measures may be possible in the future, if 'soft' (non-structural) measures, such as relocation of properties from disaster-prone areas, can be taken with the agreement of local citizens. We may be able to use more effective technologies that have been proved effective by the ongoing monitoring efforts. I hope that all-forests, rivers and the ocean of Shiretoko and the local people-will be united again.

Chairperson, the River Construction Working Group
Futoshi Nakamura
Professor, Graduate School of Agriculture, Hokkaido University

Mt. Rausu, seen from the Iwaubetsu River

The progress of the River Construction Working Group

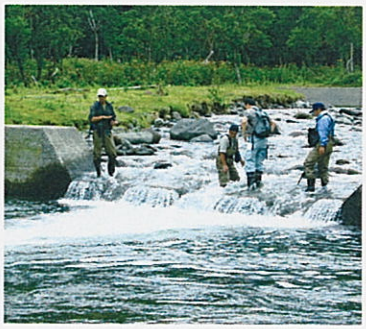
Fiscal Year		Date	The place where meeting was held
2005	1st	July 15, 2005	Sapporo
	2nd	August 26, 2005	Sapporo
	3rd	September 20-22, 2005	Shari, Rausu
	4th	December 13, 2005	Sapporo
	5th	February 22, 2006	Shari
2006	1st	June 15, 2006	Sapporo
	2nd	September 19-21, 2006	Rausu
	3rd	December 5, 2006	Sapporo
	4th	February 5, 2007	Rausu
2007	1st	September 11-12, 2007	Shari, Rausu
	2nd	November 28, 2007	Sapporo
	3rd	January 30, 2008	Sapporo

The 3rd in fiscal year 2005

The 5th in fiscal year 2005

The 1st in fiscal year 2006

The 2nd in fiscal year 2006



The 1st in fiscal year 2007

The 1st in fiscal year 2007

Glossary

Term	Definition	Related page(s) in the text
Migratory fish	Fish species that travel from one geographic location to another. Migration patterns are oceanodromous (migration within the ocean only), potamodromous (migration within fresh water only), or diadromous (migration between the ocean and freshwater in a life cycle). Salmonids are classified into the diadromous group.	P3
Redd	A place where fish lay eggs. Salmonids make spawning beds in a gravel riverbed with a water depth of 20 to 30 cm and stable water temperature and quality.	P29, P30
Ecosystem	A unit of the society of organisms, embracing biological interactions such as a food chain and relationships between organisms and their surrounding abiotic environment.	P3, P8, P12
Landslide	A type of sediment disasters. A phenomenon in which masses of soil and rock forming a slope move down over the underground sliding surface (a discontinuous plane formed inside the slope).	P1, P6
Sediment disaster	A type of natural disasters caused by the movement of soil, gravel and rock. Debris flow, landslide and slope failure fall into this disaster type.	P6, P7, P8
Debris flow	A type of sediment disaster triggered by heavy rainfall or other natural events. Sediment mixed with water (rain and ground water) flows down streams and rivers.	P6, P7, P21, P27
Pheromone	A physiologically active substance secreted by animals and microorganisms. It induces behavioral responses in another member of the same species and developmental changes.	P31
Monitoring	Repeated observation, measurement, or sampling at a site for tracking any changes over time.	P29, P30, P31
UNESCO	UNESCO stands for the 'United Nations Educational, Scientific and Cultural Organization.' It is a specialized agency of the United Nations, and was founded in 1946 based on the UNESCO Constitution. It aims to develop and promote education, science and culture. Japan joined in 1951.	P9
Catchment	A land area that is drained by a river or stream, collecting precipitation such as rain and snowmelt water within its boundary.	P1, P21, P27

Rivers of Shiretoko have globally important values, and that is why we were able to achieve the tasks described in this booklet. Dam modification to improve salmon migration will be continued based on a similar process. We believe that in the future the rivers will teem with salmonids, which play a role in material circulation, enriching the marine and forest ecosystems and yet allowing people to live with a sense of security.

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of Forestry Agency, Japan

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