State of conservation report of Shiretoko

In response to the World Heritage Committee Decision 36COM7B.12

Ministry of the Environment

Forestry Agency

January 2015

Ⅰ．Update statistics on annual Steller sea lion quotas and numbers caught and report on population trends within the property (decision:Item4)

Update statistics on annual Steller sea lion quotas and numbers caught

1. With respect to Steller sea lions (SSLs) that migrate to Hokkaido, the Fisheries Agency of Japan (FAJ) provides the Hokkaido Government every year with an annual allowable catch number, which serves as the scientific basis for management purposes. The Hokkaido Fishing Zone Coordination Commission, under the supervision of the Hokkaido Government, then sets annual catch limits.

   The annual allowable catch numbers were calculated on the basis of the PBR (Potential Biological Removal) level for the migration seasons from 2007/08 to 2013/14. For the migration seasons from 2010 to 2014, a block quota(i.e. an aggregate quota) was originally set for the five-year period based on the PBR level, and catch has been managed in accordance with that quota. The annual allowable catch numbers have therefore been calculated by reference to the degree as to how much the PBR and block quotas have been used up.

   However, for the 2014/15 migration season, which is the last year of the current block quota period, the annual allowable catch numbers were presented separately for the Sea of Japan migrating group and the Nemuro (Shiretoko) migrating group. For the Sea of Japan migrating group, the population has recovered rapidly in recent years and increased enough to be downgraded from the threatened species. On the other hand, such population recovery has started causing serious damage to the fisheries. Against this background, the annual allowable catch numbers were recalculated scientifically in accordance with a basic management approach that had been newly presented by FAJ ((i) the objective should be to minimize damage to the fisheries caused by SSLs to the extent of posing no risk of SSL extinction; and (ii) in light of the past experience of letting the population decrease to be listed as threatened species, SSLs should be managed based on the precautionary and adaptive approach). For the Nemuro (Shiretoko) migrating group, the annual allowable catch number was set to be the same as the most recent catch quota for the Nemuro district set by the Hokkaido Government within the annual catch limit.

Table 1　Annual allowable catch numbers

(Number of individuals)

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Sea of Japan migrating group	144	156	197	257	257	501
Nemuro (Shiretoko) migrating group						15

(Fisheries Agency)

2. The Hokkaido Government manages catches by allocating the catch quota for each district within the annual catch limits of SSL set by the Hokkaido Fishing Zone Coordination Commission (Table 2), and on the basis of the catch records from the previous year and the state of damage to the fisheries, as well as information on SSL spotting from fishermen. For the Nemuro district, the catch quotas have been set at a level similar to, or not substantially exceeding, the catch records for the previous year (Table 3), in spite of the fact that fisheries damage has been growing year after year.

Note that up until 2013/14, figures set for the respective districts were changed (upwards or downwards) midterm on an as-needed basis, considering the catch numbers and fisheries damage of given season, as well as information on SSL spotting from fishermen, that were relevant to the respective districts. The numbers were managed thereby to the extent that they should not exceed the prefecture-wide quota. However, as the annual catch limits have been presented separately for the Sea of Japan migrating group and for the Nemuro migrating group - an approach that has started from 2014/15 as described earlier - proper catch management is now slated to continue so that catches should not exceed the respective catch limit (501 for the Sea of Japan migrating group and 15 for the Nemuro migrating group).

Table 2　Annual catch limits of SSL in Hokkaido offshore waters

(Number of individuals)

	2009/10 (2009.10.1 -2010.6.30)	2010/11 (2010.10.1 -2011.6.30)	2011/12 (2011.10.1 -2012.6.30)	2012/13 (2012.10.1 -2013.6.30)	2013/14 (2013.10.1 -2014.6.30)	2014/15 (2014.9.1 -2015.6.30)
Hokkaido	144	156	197	253	253	516

(Hokkaido Fishing Zone Coordination Commission)

Table 3　Catch quota or Annual catch limit for the Nemuro district within the annual catch limits shown in Table 2

(Number of individuals)

	2009/10 (2009.10.1 -2010.6.30)	2010/11 (2010.10.1 -2011.6.30)	2011/12 (2011.10.1 -2012.6.30)	2012/13 (2012.10.1 -2013.6.30)	2013/14 (2013.10.1 -2014.6.30)	2014/15 (2014.9.1 -2015.6.30)
Nemuro district	12(*1)	10	12	12→15(*2)	12→15	15

(Hokkaido Government)

* Catch figures set for the Nemuro district containing the Shiretoko World Natural Heritage Site

(*1) The 2009/10 figures are the numbers set for "Other districts" excluding Soya, Rumoi, Ishikari and Shiribeshi

(*2) (→) indicates a change in the set figure made midterm in consideration of the state of fisheries damage, etc.

Table 4　State of catches

(Number of individuals)

	2009/10 (2009.10 -2010.6)	2010/11 (2010.10 -2011.6)	2011/12 (2011.10 -2012.6)	2012/13 (2012.10 -2013.6)	2013/14 (2013.10 -2014.6)
Hokkaido	122	115	195	249	253
Nemuro district	8	6	10	14	13

* This shows the catch records for the Nemuro district and is not limited to the area within the Shiretoko World Natural Heritage Site.

(Hokkaido Government)

Report on population trends within the property

3. The population of the Eastern subspecies, found to the east of Cape Suckling in Alaska, has been on the rise since the mid 1970s at the rate of approximately 3% per year. The population of the Central in the vicinity of the Aleutian Islands, belonging to the Western subspecies found to the west of the same cape, dropped rapidly in the 1970s, but has been increasing slightly (1% yr^{-1}) since 2000. The Asian group, another among the Western subspecies that occurs to the west of the Commander Islands, experienced a rapid population decline up until the 1980s, but it has then either remained stable or decreased in the west of the Bering Sea and to the east of the Kamchatka Peninsula, while showing an upward trend in recent years in the Kuril Islands and the Sea of Okhotsk at the rate of 4% yr^{-1}. In particular, a sharp increase in pup number has been marked on Tuleny Island in the vicinity of Sakhalin.

   In the red list revision in 2012, the International Union for Conservation of Nature (IUCN) lowered the category of the species from Vulnerableto Near Threatened. In Japan, SSLs were assessed as Vulnerable (VU) on the red lists issued by the Ministry of the Environment but the category was lowered to Near Threatened (NT) in the red lists revised in 2012 (the 4th Version of the Japanese Red Lists, released on August 28, 2012). The reasons include: it is estimated that there are roughly 5,800 SSLs migrating to Japan (FY2009, Fisheries Agency) and; the population of their origin, the Asian group, has been on the increase since the 1990s (Fisheries Agency and Fisheries Research Agency, "FY2013 Current Status of International Fishery Stocks").

4. The state of SSL migration on the east coast of the Shiretoko Peninsula is surveyed by frequent land-based sighting survey in the winter season between November and February, with six fixed observation points set along the coastline of Rausu Town and the northern part of Shibetsu Town. Ever since the largest count (*3) attained 126 in 2009/10 (between November 16, 2009 and February 15, 2010), the spotting of over 100 migrating SSLs is confirmed every year.

(*3) A series of land-based observation on swimming SSLs were performed at a total of 6 fixed observation points along the eastern coast of the Shiretoko Peninsula including the Heritage area. Sequential counts were taken when swimming SSLs were found during a 5-10 minutes of scanning of the sea surface from each observation point, using 8x to 10x binoculars. After a series of counts continuing 10-30 minutes, a maximum count was adopted as the data of the day

at each point. The numbers of SSLs counted on the same day at the six points were summed up (a daily count). The survey was performed for multiple days including the peak period of SSLs' sighting (between mid-Dec. and mid-Jan.) in each year, the largest value of the daily counts for each season was defined as the "largest count." Note that on the east coast of Shiretoko Peninsula, there is no SSL hauling out while they float and rest in groups off the coast of each of the particular locations (which match the observation points described above) during daytime between November and February. For that reason, any count of SSLs landing occasionally at some locations is not appropriate as a means of studying SSLs as far as Shiretoko is concerned.

Table 5　State of SSL wintering migration on the east coast of Shiretoko Peninsula after the World Heritage List inscription (Largest count by survey year)
(Number of individuals)

2006/07 winter season (2006.10.21 -2007.4.26)	2007/08 winter season (2007.9.30 -2008.3.8)	2008/09 winter season (2008.11.3 -2009.3.10)	2009/10 winter season (2009.11.16 -2010.2.15)	2010/11 winter season (2010.11.15 -2011.2.14)	2011/12 winter season (2011.10.22 -2012.2.4)	2012/13 winter season (2012.11.21 -2013.2.12)	2013/14 winter season (2013.11.2 -2014.2.7)
95	98	60	126	179	128	131	110

(Ishinazaka *et al.* (2009), Bulletin of the Shiretoko Museum 30:27-53.; Shiretoko Nature Foundation independent research project data (Proceedings of the 17th Conference of the Wildlife Conservation Society of Japan, pp. 85-86, etc.), Ishinazaka (2009) *Eumetopias jubatus* (Schreber, 1776) In: The Wild Mammals of Japan. Shoukadoh, Kyoto, pp. 284-285)

II . Report on the state of conservation of the property, including progress achieved in addressing the conflict between fishers and Steller sea lion (Decision:Item6)

1. Damage to the fisheries caused by SSLs consists of direct damage in the form of broken nets and indirect damage due to lost fishery incomes resulting from damaged catches and loss of fishing opportunity by broken nets. The amount of those damages to the coastal fisheries in Hokkaido has exceeded one billion yen for 20 years, and the situation has become increasingly serious in recent years, especially due to the growing population of migrating SSLs and their extended migration periods, among other factors.

Table 6 State of fisheries damage caused by SSLs (Hokkaido)

(In millions of yen)

	FY2009	FY2010	FY2011	FY2012	FY2013
Amount of damage to fishing gear	661	710	680	530	529
Nemuro district portion	5	—	—	—	55
Amount of damage to catches	693	898	818	1,082	1,449
Nemuro district portion	11	51	63	209	302
Sum total	1,354	1,608	1,497	1,612	1,979
Nemuro district portion	16	51	63	209	357

* The amounts of damage for the Nemuro district is not limited to the area within the Shiretoko World Natural Heritage Site.

(Hokkaido Government)

2. In Hokkaido, there are prefecture-wide efforts under which the Liaison Committee for Mammal Damage Prevention was set up in the government's headquarters, as well as a Liaison Council for Marine Mammal Damage

Prevention in each (general) subprefectural bureau including in the Nemuro Subprefectural Bureau, and comprehensive marine mammal-control steps are pushed forward in partnership with groups associated with the fisheries, municipal governments, associated prefectural government bodies and other organizations, working to ensure accurate comprehension of the state of damage through fisheries damage surveys and to provide support for actions being taken to address the damage, including introducing reinforced bottom pound nets and implementing capture procedures.

In the Nemuro district, Rausu Town developed a wildlife damage prevention plan in an effort to address fisheries damage, including implementing repelling or capture procedures, and is planning to continue taking further steps aimed at the coexistence of SSLs and fisheries, with various organizations working in cooperation.

Furthermore, the Ministry of the Environment and the Hokkaido Government have also established the Multiple Use Integrated Marine Management Plan for Shiretoko World Natural Heritage Site with the aim of achieving two goals together: the conservation of the marine ecosystem and the lasting and productive fisheries through the sustainable use of marine resources in the waters within the heritage site.
With the SSL designated as one of the indicator species characterizing the marine ecosystem of Shiretoko in the course of those actions, monitoring surveys, including counting the number of migrating SSLs, are carried out and their findings are reported to the Shiretoko World Natural Heritage Site Scientific Council, which then provides advice from scientific perspectives: efforts are thus being made for the purpose of marine ecosystem conservation and management in the waters within the heritage site.

III . To continue monitoring the status of salmonid migration and spawning, and consider further river construction modifications including other appropriate measures, as needed, on the Rusha River in order to ensure natural salmonid migration and spawning (Decision: Item5)

The continuation of monitoring

1. For the purpose of verifying whether salmonid migration and spawning have been improved as a result of modifications made to 13 river structures built on five rivers (see Appendix 1: Shiretoko River Position Map), monitoring (including number of upstream runs of salmonid species, number of spawning beds, riverbed gradient, particle size distribution of the gravel bed, and flow velocity) has been conducted for a period of three years after the modifications. Nearly all of the monitoring was completed by 2013, but to verify whether the modifications continue to be effective, monitoring will be conducted for the periods 2013 - 2014 and 2019 - 2020 as well (the results of monitoring conducted so far are shown in Appendix 2: Effects of Modifications to River Structures).

2. Furthermore, long-term monitoring of the number of fish runs and the number of spawning beds for pink salmon, a salmonid species with a large number of individuals migrating upstream in Shiretoko, has been conducted since 2013 on three rivers (Rusha River, Teppanbetsu River, and Rusa River) in the property's core area.

   This monitoring, which was developed for the purpose of managing the heritage site adaptively based on scientific knowledge for the period from FY2012 to FY2021, is being conducted based on the Long-term Monitoring Plan for the Shiretoko World Natural Heritage Site.

Concerning the Rusha River

3. Of the three check dams[*1] in place on the Rusha River, the two upstream dams were modified in 2006. The results of monitoring conducted subsequently show that ratio of chum salmon spawning beds made on the upstream side of the dams had increased compared to before the modifications, indicating that the modifications were effective to a certain extent. The salmon and trout hatchery facilities at the mouth of the river were removed in 2012.

4. While the modifications have shown to have positive effects, the following issues have also arisen.

   i. The river bed on the downstream side of Dam No. 1, which is the farthest check

dam downstream, has been degrading in recent years, and there are concerns that this may have an adverse effect on upstream runs of salmonid species.

ii. The number of spawning beds in the reaches between the dams (from Dam No. 1 through Dam No. 3) is roughly half that of the beds in the reaches upstream or downstream of the check dams. One possible reason is that channels suited to spawning have not formed because of fixation of the watercourses and blockage of hyporheic flow caused by the dams.

5. For these reasons, beginning in 2012 the River Construction Advisory Committee[*2] and Hokkaido Government, while exchanging views with local parties concerned, have been studying the possibility of further modifications to these river structures on the condition that a balance can be struck between improving the spawning environment of salmonids and maintaining the disaster-prevention role of the check dams for set net fishing grounds around the mouth of the river. The Committee and Hokkaido Government are working towards a decision on specific further modification methods, with the aim of reaching that decision in 2015.

6. Some ideas have been suggested, including removing the middle part (including the foundation) of all three check dams, as well as lowering the height. It has also been suggested, in the case modifications are to be implemented, to implement them over the course of at least several years sequentially from the upper-most dam, while carefully monitoring the impact on objects that need to be protected and the improvements to the spawning environment.

Scientific advice and the cooperation of local parties concerned

7. In studying and implementing these measures, the Forestry Agency and Hokkaido Government have asked experts in the committee for scientific advice, and local parties concerned for understanding and cooperation.

*1. The three river structures, i.e. the check dams, on the Rusha River were built by Hokkaido Government from 1974 to 1979 in response to demands from the community in the wake of damage to salmon and trout hatcheries, set net fishing grounds located near the mouth of the river caused by debris flow during torrential rainfalls in 1972 and 1973.

In 2005, the River Construction Working Group (see next item), which consisted of experts in the fields of river environment conservation, fish, erosion-control engineering and other areas, and related administrative authorities, made the assessment concerning the two check dams upstream that salmonids (especially chum salmon)

were either unable or just barely able to migrate upstream. For this reason, in 2006, Hokkaido Government carried out structure modifications on these two check dams that included cutting parts of them down.

*2. The River Construction Advisory Committee is a committee established under the Shiretoko World Natural Heritage Site Scientific Council. The Committee provides technical advice on modifications and scientific advice concerning the implementation of appropriate monitoring and assessments. The Committee is the successor of the River Construction Working Group (FY2005 - 2007).

IV . To submit a report on the state of conservation of the property, including on progress achieved in improving natural salmonid migration and spawning within the property (Decision: Item6)

1. The Forestry Agency and the Hokkaido Government, which were the builders of the river structures, held meetings of the River Construction Working Group* from FY2005 to FY2007, and made decisions on the propriety of modifications to 100 river structures in the property, based on assessments of the impact on the upstream migration of salmonids and the changes to the disaster-prevention role of the river structures for local residents resulting from modifications to them.

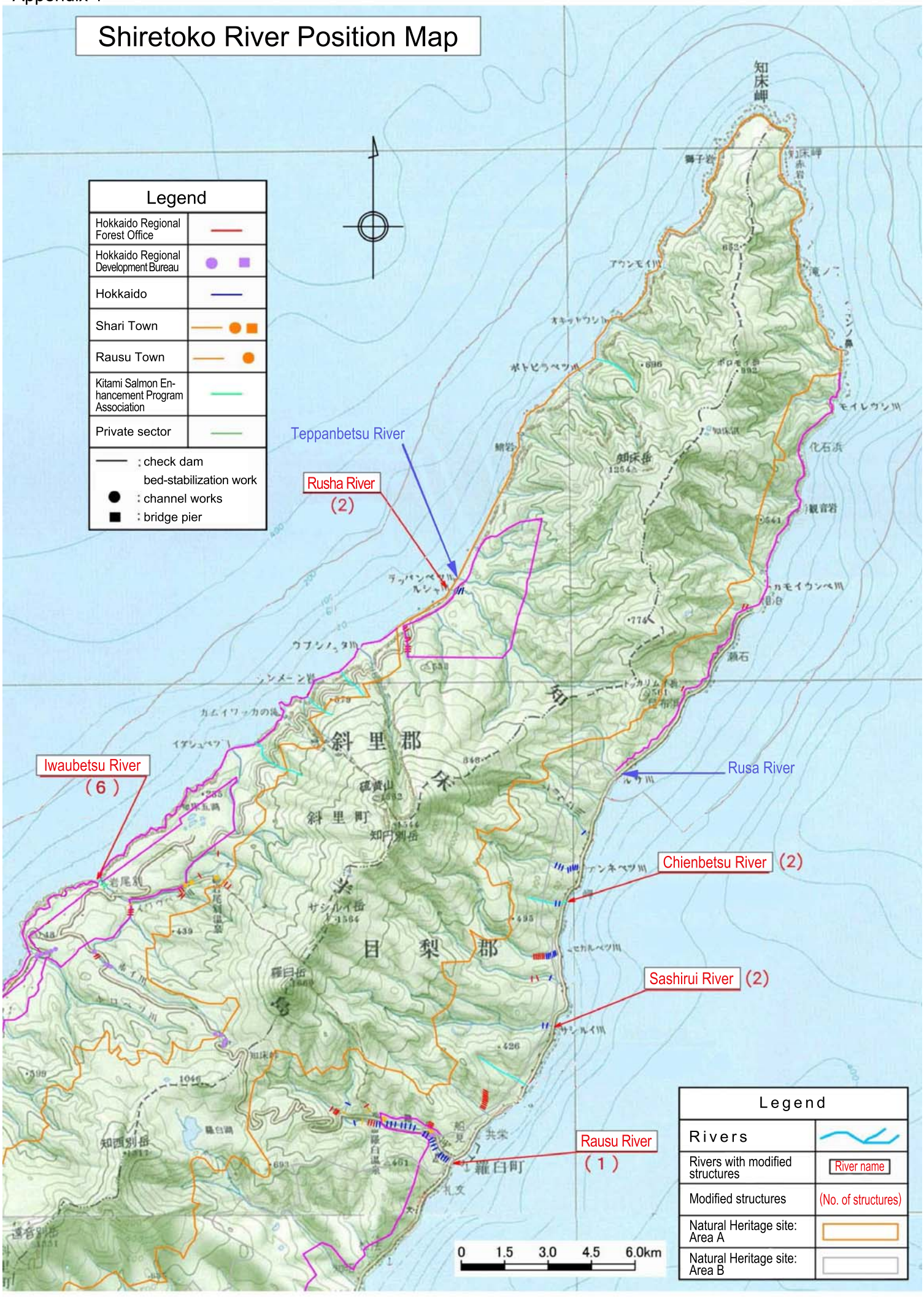
   It was decided that modifications should be implemented for 13 river structures, and in accordance with the basic principles of making salmonid migration possible just by modifying existing facilities and avoiding to the extent possible the construction of new facilities associated with these modifications, all modifications were completed by the respective builders by 2013.

2. The results of salmonids monitoring conducted after the modifications to the river structures clearly demonstrate the effectiveness of modifications. As an example, they show that the ratio of spawning beds in the areas upstream of the modified river structures had increased (see Appendix 2: Effects of Modifications to River Structures). Although modifications were carried out with priority placed on the migration of salmonids, there were instances in which the river environments did not change to more appropriate conditions for spawning because, when deciding on the modification to make, insufficient consideration was given to how flow velocity would be inhibited upstream and downstream of the structures and how gravel composition upstream and downstream would be altered by the modifications. For this reason, it was decided that the effects of the modifications should be evaluated over the long term through continued monitoring (as described in III. 1).

3. Furthermore, beginning in 2013, the River Construction Advisory Committee has been studying the possibility of modifications to 35 river structures which, in the assessments mentioned above, were deemed to have potential in terms of improving the upstream migration and spawning of salmonids but for which the decision was made to maintain their current state because of the large impact on their disaster-prevention and other roles. These potential modifications have been studied with a view to creating river environments more appropriate for spawning by making the best possible use of the outcome and assessments of the 13 structure modifications.

*The River Construction Working Group was established under the Shiretoko World Natural Heritage Site Scientific Council in 2005 simultaneously with the listing of Shiretoko as a World Natural Heritage Site. It was formed for the purpose obtaining expert advice on 1) assessing environments around river structures, 2) assessing river structures in terms of salmonid habitats and continued disaster-prevention, and 3) studying potential modification methods based on those assessments. The River Construction Working Group has now been succeeded by the River Construction Advisory Committee.

Appendix 1


Shiretoko River Position Map
Legend
Hokkaido Regional Forest Office
Hokkaido Regional Development Bureau
Hokkaido
Shari Town
Rausu Town
Kitami Salmon Enhancement Program Association
Private sector
: check dam
bed-stabilization work
: channel works
: bridge pier
Teppanbetsu River
Rusha River
(2)
Iwaubetsu River
(6)
Rusa River
Chienbetsu River
(2)
Sashirui River
(2)
Rausu River
(1)
斜里郡
目梨郡
斜里町
羅臼町
知床岬
知床岳
羅臼岳
知西別岳
0 1.5 3.0 4.5 6.0km
Legend
Rivers
Rivers with modified structures
River name
Modified structures
(No. of structures)
Natural Heritage site: Area A
Natural Heritage site: Area B

Appendix 2

Effects of Modifications to River Structures

1. Background

The River Construction Working Group of the Shiretoko World Natural Heritage Site Scientific Council found that it was appropriate to make deliberate modifications to 13 river structures on five rivers within the Shiretoko World Natural Heritage Site (Fig. 1).

These structures were modified during the period from 2006 to 2012. The status of the upstream runs of salmonid species and the number of spawning beds have been monitored on a continuing basis.

Fig. 1 Rivers in the Shiretoko World Natural Heritage Site

2. Effects of modifications to river structures

Below we describe the effects of modifications to the 13 river structures, according to each target river.

1) Sashirui River

Year of modification	No. of structures modified	Modification method
2007	2	Modification of existing fishways

There had been two existing fishways on the Sashirui River, but their structures had not been sufficiently conducive to fish runs. These structures were therefore modified to make them suitable for upstream runs (Fig. 2).

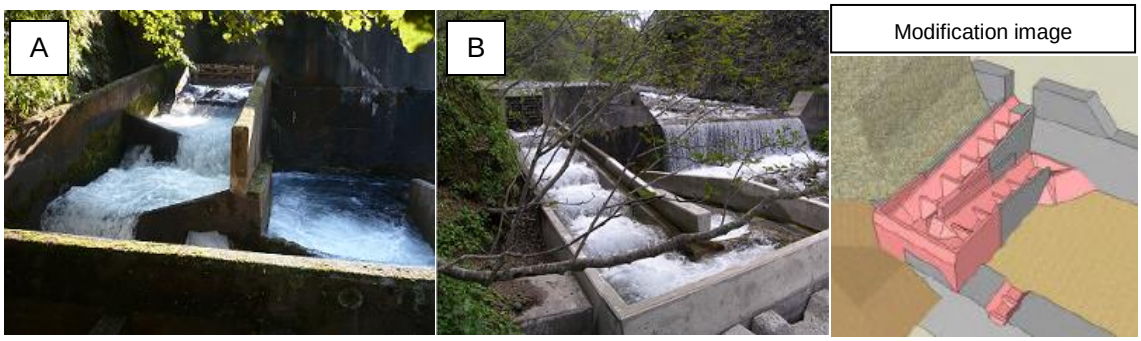


Fig. 2 Fishway at a check dam before and after modification

A: Before modification, B: After modification

◆Effects of modifications

The beneficial effects of fishway modifications were verified by observing the number of salmonid spawning beds upstream of the modifications. The ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed had increased after the 2007 modifications (Fig. 3).

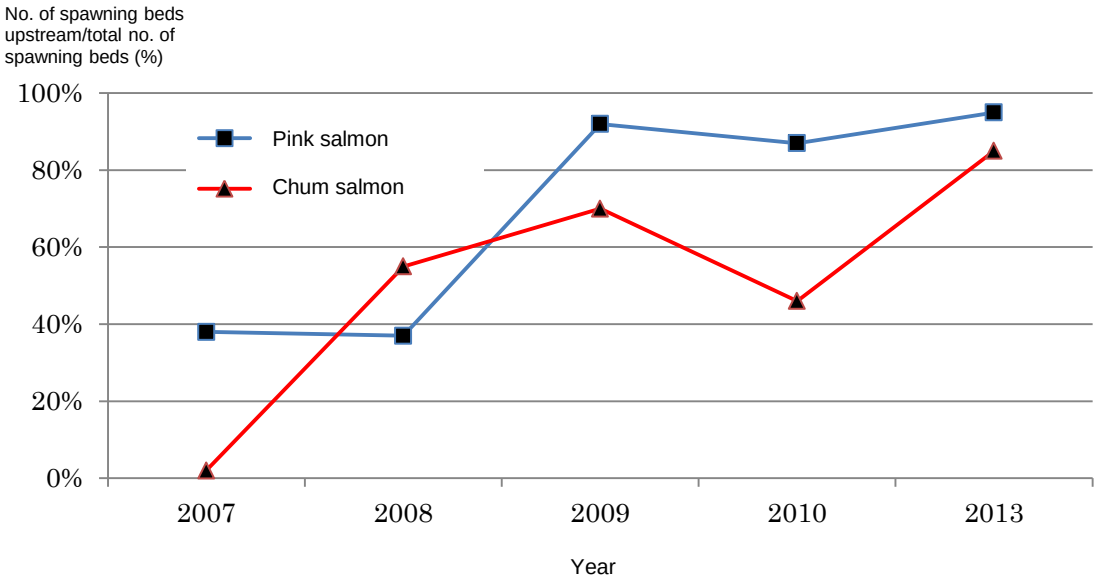


Fig. 3 Sashirui River: Changes in the ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed
(2007 data indicates the ratio of the number of spawning beds before the fishway modifications)
The fishways were modified in 2007.

2) Chienbetsu River

Years of modification	No. of structures modified	Modification method
2008, 2009	2	Installation of new fishways

Two check dams had been built on the Chienbetsu River but no fishways had been installed, rendering the upstream runs for salmonid species impossible. For this reason, new fishways were installed (Fig. 4).

Fig. 4 Check dam before and after modification by installation of a fishway

A: Before modification, B: After modification

◆Effects of modifications

The beneficial effects of the fishway modifications were verified by observing the number of salmonid spawning beds upstream of the modifications. The ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed had increased after the 2008-2009 modifications (Fig. 5).

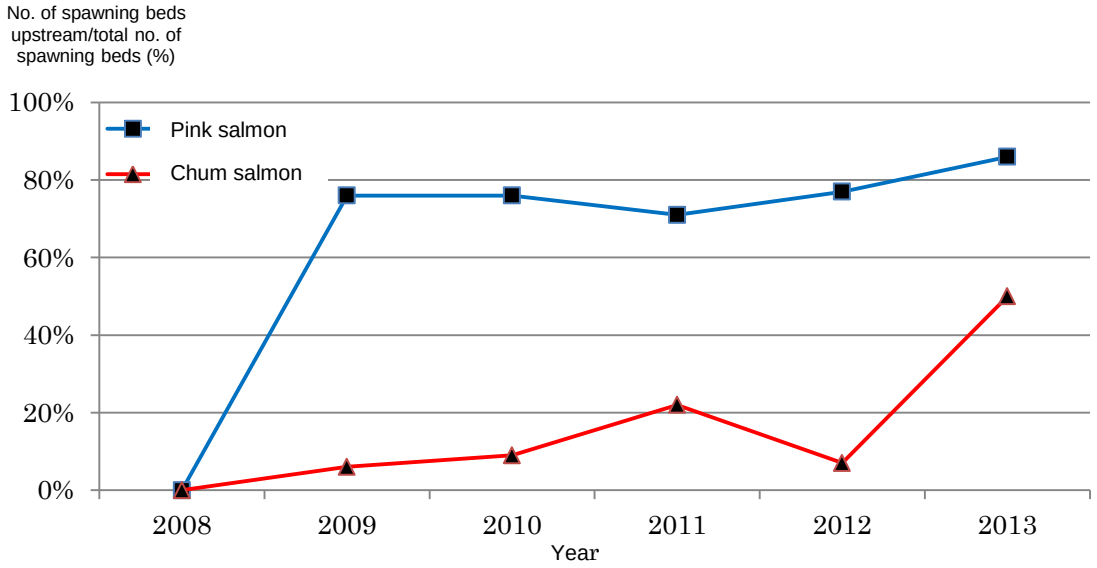


Fig. 5 Chienbetsu River: Changes in the ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed
(2008 data indicates the ratio of the number of spawning beds before the fishway installations)
The fishways were installed in 2008 and 2009.

3) Iwaubetsu River

Years of modification	No. of structures modified	Modification method
2006–2010	6	Making slits and lowering dam height

Five check dams and one water channel had been built on tributaries of the Iwaubetsu River, rendering the salmonids' upstream runs impossible. These six structures were therefore modified by making slits and lowering dam height (Fig. 6).

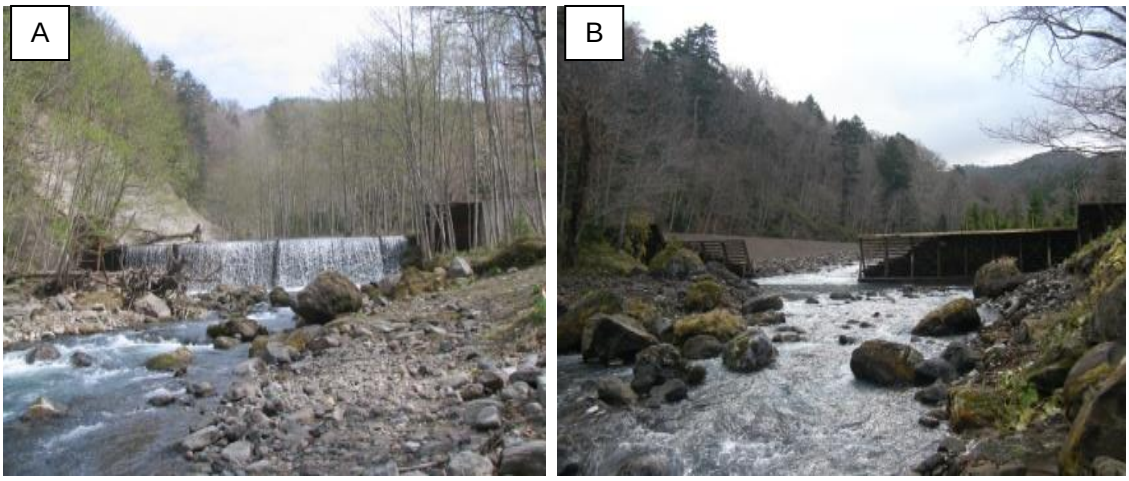


Fig. 6 Check dam before and after modification by making slits and lowering dam height
A: Before modification, B: After modification

◆Effects of modifications

The beneficial effects of making slits and lowering dam height were verified by observing the number of salmonid spawning beds upstream of the modifications. The ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed had increased after the 2006–2010 modifications (Fig. 7).

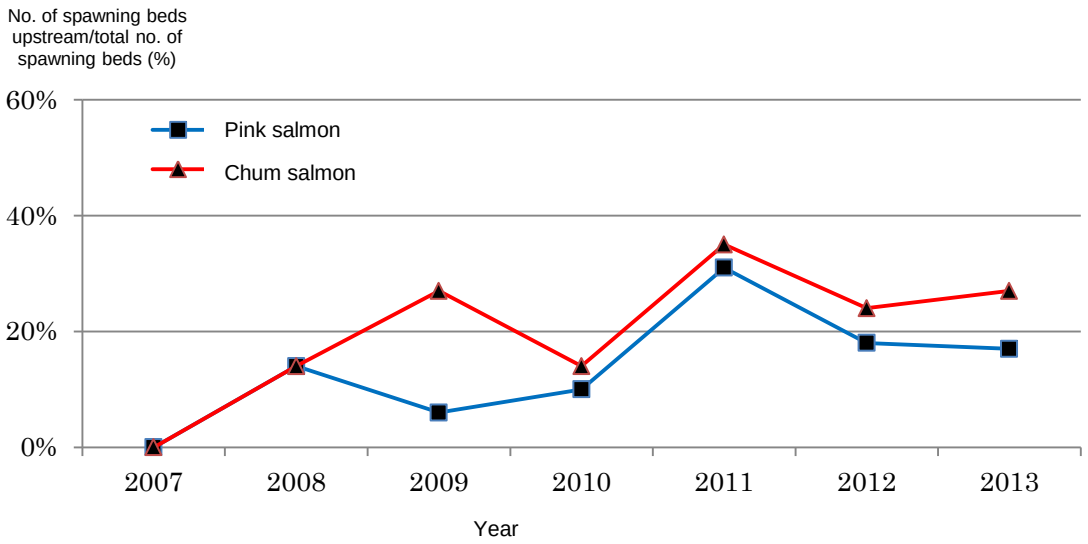


Fig. 7 Iwaubetsu River: Changes in the ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed
The modifications were made from 2006 to 2010.

4) Rusha River

Year of modification	No. of structures modified	Modification method
2006	2	Making slits and notches

Three check dams had been built on the Rusha River. Two upstream structures were modified by making slits and notches in them to enable freer upstream migrations of salmonid species (Fig. 8).

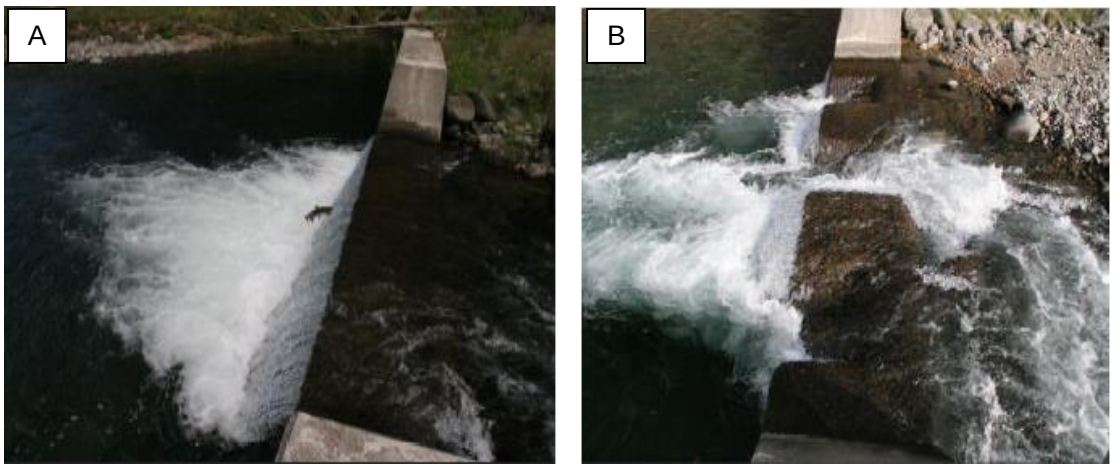


Fig. 8 Check dam before and after modification by making slits and notches
A: Before modification, B: After modification

◆Effects of modifications

The beneficial effects of making slits and notches were verified by observing the number of salmonid spawning beds upstream of the modifications. The ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed had increased after the 2006 modifications (Fig. 9).

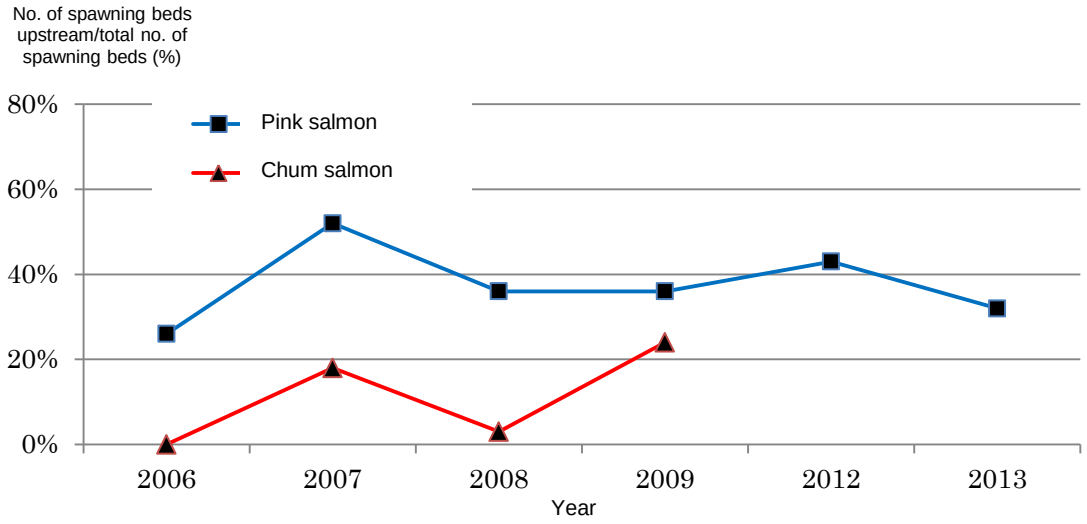


Fig. 9 Rusha River: Changes in the ratio of the number of spawning beds observed upstream of the check dams to the total number of spawning beds observed
The modifications were made in 2006.
No surveys were conducted in 2010 and 2011 for either species, and no chum salmon surveys were conducted in 2012 and 2013.

5) Rausu River

Years of modification	No. of structures modified	Modification method
2009–2012	1	Making slits

Twenty-eight river structures had been built on the main stream of the Rausu River, and modifications had been made to 18 of these structures from the river mouth upward by installing fishways. These modifications had been started in advance of the area's inscription on the World Heritage List and had been completed by 2007. Although the salmonids' upstream runs had been extended and the extent of their spawning beds increased as a result, the salmonids had remained unable to run upstream of a check dam built about 3.3 km from the river mouth. For this reason, the check dam was modified by making slits (Fig. 10).

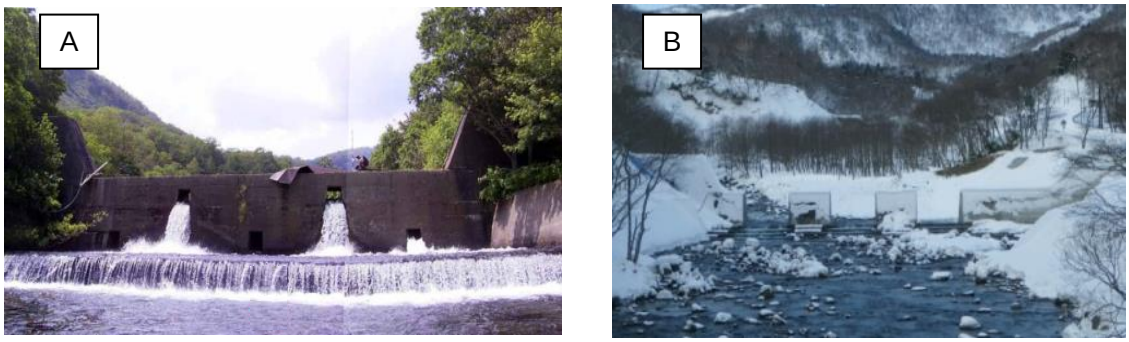


Fig. 10 Check dam before and after modification by making slits
A: Before modification B: After modification

◆Effects of modifications

The beneficial effects of making slits were verified by observing the number of salmonid spawning beds upstream of the modification. After 2009, the salmonid upstream runs and the spawning beds began to extend upstream beyond the modified check dam (about 3.5 km from the river mouth).

In contrast, the ratio of the number of salmonid spawning beds upstream of the modified check dam to the total number of spawning beds did not change significantly from the first year after the modification ended because of the presence of a salmon and trout capture project at the river mouth; as part of this project, hatchery weirs (*urai* in Japanese) had been placed on the river. The beneficial effects of the modification will be continuously monitored (Fig. 11).

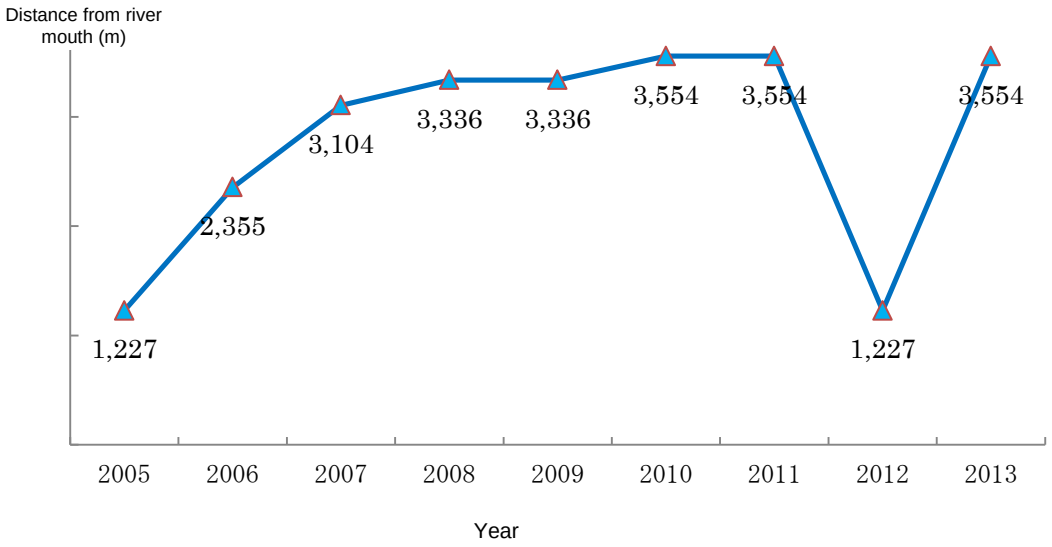


Fig. 11 Changes in the greatest distance upstream from the mouth of the Rausu River where spawning beds were confirmed to be present
The modification by making slits was made from 2009 to 2012.

Note 1: Area in which salmonid spawning beds were confirmed

2: In the Rausu River, modifications to downstream river structures by installing fishways began before the area's inscription on the World Heritage List. As a result, the extents of the upstream runs and the spawning beds increased consecutively up until 2009, when modification of the check dam by making slits was begun.

3: In 2012, the upstream runs were difficult because spring floods increased the drop height at the downstream river structure. The following year this problem was resolved and the salmonid species once again ran upstream beyond the structure.