

Long-Term Monitoring Plan for the Shiretoko Natural World Heritage Site (Amendment)

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1. Objective

Long-term monitoring is implemented for adaptive management of the heritage site based on scientific knowledge, within the scope of the management measures stipulated in the Management Plan for the Shiretoko Natural World Heritage Site.

This Plan was formulated in order to define the monitoring items and contents required for “effective and efficient” implementation of adaptive management.

2. Basic Monitoring Policy

This Plan establishes the evaluation items required for implementation of adaptive management, and defines the monitoring items and contents used to obtain the necessary data for each evaluation item.

1) Evaluation items

The following evaluation items are applied to determine whether the criteria of the Shiretoko Natural World Heritage Site are being upheld, whether UNESCO and IUCN recommendations are being complied with, and whether management is being carried out according to the Heritage Site Management Plan. The reasons for selecting each evaluation item are shown in Appendix 1.

- I The productivity of a unique ecosystem is being maintained.
- II The interaction between marine and terrestrial ecosystems is being maintained.
- III Biodiversity is being maintained at the same level as when the site was inscribed on the World Heritage List.
- IV Conservation of marine ecosystems within the heritage site is being balanced with stable fishing through sustainable use of fisheries resources.
- V Impact of river constructions has been lessened so as to maintain river ecosystems that can support salmonid species reproduction.

- VI Excessive influence of high sika deer (*Cervus nippon yessoensis*) population density on the ecosystem of the heritage site is not occurring.
- VII Recreational utilization of the site and other human activities are being balanced with conservation of the natural environment.
- VIII Impacts, or potential impacts of climate change are being tracked early.

2) Monitoring items

A list of monitoring items used to obtain the necessary data for each evaluation item has been prepared. Multiple monitoring items are set to evaluate each individual item. There are some monitoring items that correspond to different evaluation items since the items that contribute to the evaluation of multiple evaluation items are selected (so as not to increase the number of monitoring items), There are 37 monitoring items in all, classified as follows in accordance with the implementing body (Appendix 2).

- i) Monitoring items mainly implemented by relevant government agencies
*In this case, “relevant government agencies” refers to the Ministry of the Environment, the Forestry Agency, and the Hokkaido Prefectural Government.
- ii) Monitoring items implemented in cooperation with local governments, related bodies, experts, and other government agencies besides those mentioned in i)

Surveys and research that does not fit the above two classifications will be considered and implemented under a third classification, “iii) Other surveys and research”

3) Monitoring methods and evaluation criteria

Regarding the monitoring items for each evaluation item, the implementing bodies, evaluation bodies, monitoring methods, evaluation indicators, and evaluation criteria are as shown in Appendix 3. No evaluation criteria are established for the monitoring items that are designed to collect basic information as reference data to be used for considering various measures. Monitoring methods, evaluation indicators and evaluation criteria are to be “easily implementable,” “indicators that allow advance detection of future changes,” and “easy to evaluate.” The methods, indicators and criteria may be flexibly revised, even during the implementation period, as the situation requires.

4) Implementation of monitoring and sharing of results

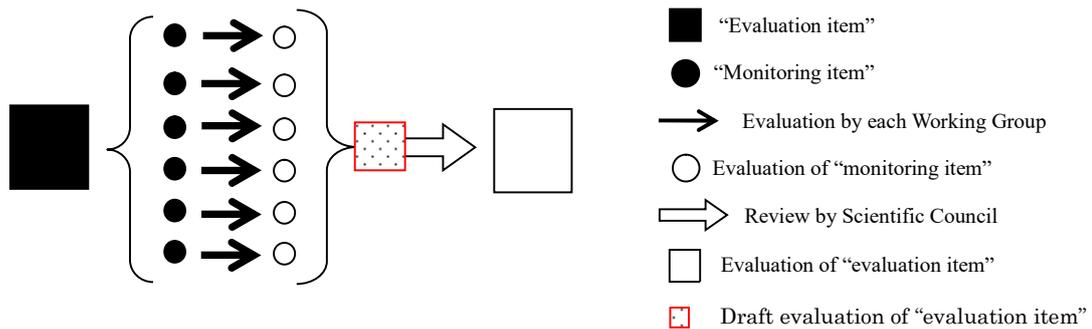
Monitoring is implemented through close collaboration and cooperation among all relevant parties, and information on monitoring and survey results are shared as needed.

3. Evaluation procedure

Evaluation items are evaluated based on the evaluation of monitoring items. Each monitoring item is evaluated individually based on the monitoring results.

The Scientific Council makes evaluation of each of the eight evaluation items. In principle, each individual Working Group and Advisory Panel¹ (hereinafter referred to as “WG/AP”) makes evaluation of each monitoring item.

Schematic diagram of evaluation procedure



Evaluation item for each Working Group are to be individually assigned in accordance with the field of specialization, as follows, so as to harness the specialized expertise of each Working Group. Each Working Group is to evaluate the monitoring item(s) relevant to that Working Group’s evaluation items.

- ✧ Marine Area Working Group: I, IV
- ✧ Sika Deer and Brown Bear Working Group: VI
- ✧ River Construction Advisory Panel: V
- ✧ Appropriate Use and Ecotourism Working Group: VII

If it is difficult for the WG/AP to evaluate the monitoring results, it is not precluded for a member of the Scientific Council or an external expert or the Review Meetings who can make an evaluation to make such an evaluation in place of the WG/AP.

Furthermore, each WG/AP independently or jointly prepares a draft evaluation for evaluation items. The Scientific Council then confirms the draft evaluation and determines an evaluation for the evaluation item. Evaluation of the evaluation items is to start where possible to complete the evaluation during the period of this plan.

4. Framework of the plan

1) Duration of plan

¹ The River Construction Working Group was reorganized as the River Construction Advisory Panel.

The duration of one period of the plan is 10 years, with the first period beginning in April 2012 and ending in March 2022. Deliberations on the continuation and/or revision of the plan are to be held every five years or so.

2) Other

Relevant government agencies determine the contents of monitoring projects each year based on this Plan, and perform the necessary monitoring and surveys for that fiscal year to the extent of their ability. If there is any monitoring item for which it is difficult or not appropriate to conduct an evaluation annually based on factors such as the implementation status of surveys, WG/AP which is in charge of the said evaluation will determine an appropriate timing and other details of the evaluation. Each fiscal year, the delegation of duties may be revised as needed.

Formulated in February 2012

Partially revised (1st) in February 2015

Entirely reviewed (1st) in March 2019

	Evaluation item	Reason for selection	Basis for selection
I	The productivity of a unique ecosystem is being maintained	This was one of the criteria on which Shiretoko was inscribed as a natural world heritage.	Criterion (ix): Shiretoko provides an outstanding example of the interaction of marine and terrestrial ecosystems, as well as extraordinary ecosystem productivity, largely influenced by the formation of seasonal sea ice at the lowest latitude in the northern hemisphere.
II	The interaction between marine and terrestrial ecosystems is being maintained	This was one of the criteria on which Shiretoko was inscribed as a natural world heritage.	Criterion (ix): Shiretoko provides an outstanding example of the interaction of marine and terrestrial ecosystems, as well as extraordinary ecosystem productivity, largely influenced by the formation of seasonal sea ice at the lowest latitude in the northern hemisphere.
III	Biodiversity is being maintained at the same level as when the site was inscribed on the World Heritage List	This was one of the criteria on which Shiretoko was inscribed as a natural world heritage.	Criterion (x): Shiretoko has particular importance for a number of marine and terrestrial species. Combining northern species from the continent and southern species from Honshu, the property supports a range of animal species. These include a number of endangered and endemic species, such as the Blackiston's Fish owl and the plant species Viola kitamiana. The property has one of the highest recorded densities of brown bear populations in the world. The property has significance as a habitat for globally threatened sea birds and is a globally important area for migratory birds.
IV	Biodiversity is being maintained at the same level as when the site was inscribed on the World Heritage List	This is recommended in the UNESCO/IUCN Report.	Recommendation 4: Consider identifying and designating locally relevant conservation zones, including no take zones, and practices within the marine habitat to ensure sustainable productivity of the marine biodiversity, including for sustainable production of the fishery resource. ----- Recommendation 6: Address the declining population trends of the two indicator species - Walleye pollock and Stellar Sea lion – through sound management interventions for their sustainable conservation within the property and through cooperative measures with relevant parties for areas outside the marine component of the property.
V	Impact of river constructions has been lessened so as to maintain river ecosystems that can support salmonid species reproduction	This is recommended in the UNESCO/IUCN Report.	Recommendation 7: Continue and accelerate measures to promote the free movement of salmon within the property and also to increase salmon escapement. ----- Recommendation 9: Continue and accelerate monitoring efforts within the property, with particular attention to the impact of the modification of constructions on the movement of salmon populations within and outside the property.
VI	Excessive influence of high sika deer population density on the ecosystem of the heritage site is not occurring.	This is recommended in the UNESCO/IUCN Report.	Recommendation 10: Clear indicators should be developed to help define acceptable and unacceptable limits for the impact of grazing from Sika Deer on natural vegetation in the property.
VII	Recreational use of the site and other human activities are being balanced with conservation of the natural environment.	This is stated in the Management Plan for the Shiretoko Natural World Heritage Site.	p.9 4. Basic policies of management f. Recreational use and conservation of the natural environment: Conservation of the virgin natural environment will be ensured in a manner compatible with its recreational use, including tourism, which is a major industry in the region.
VIII	Impacts, or potential impacts of climate change are being tracked early.	This is stated in the Management Plan for the Shiretoko Natural World Heritage Site.	p.9 4. Basic policies of management g. Management from a broad perspective: The heritage site will be properly managed in consideration of global issues such as climate change, which have a serious impact on the site's ecosystem.

List of long-term monitoring items

Appendix 2

(1) Monitoring items mainly implemented by relevant government agencies

No.	Monitoring items	Corresponding evaluation items
1	Observation of the water temperature and chlorophyll a using satellite remote sensing	I, IV, VIII
2	Fixed-point observation of water temperature using ocean observation buoys	I, IV, VIII
3	Seal survey	I, III, IV, VIII
4	Marine biota and distribution survey (shore region survey)	I, II, III
5	Shellfish quantitative survey in shore region	I, II
6	Survey of spectacled guillemot, black-tailed gull, slaty-backed gull, and Japanese cormorant populations, nesting site distribution, and number of nests	II, III, IV, VII
7	Survey of vegetation change (forest vegetation and grassland vegetation) in sika deer population control area	VI
8	Survey of vegetation shift throughout the Shiretoko Peninsula (forest vegetation, coastal vegetation, and alpine vegetation)	III, VI, VIII
9	Growth and distribution surveys of the rare plant <i>Viola kitamiana</i>	III, VIII
10	Survey of sika deer status in their main wintering grounds (aerial counting survey and terrestrial counting survey)	VI
11	Terrestrial invertebrate survey (mainly insects)	III, VI
12	Terrestrial bird survey	III, VI
13	Survey of small- and medium-sized mammals (including survey of alien species)	III
14	Preparation of wide-area vegetation map	III, VIII
15	Survey of damage to human activities caused by brown bears	VIII
16	Survey of the brown bear population in the Shiretoko Peninsula	II, III
17	Monitoring of the number of salmonids migrating upstream, spawning grounds, and spawning beds in rivers	II, IV, V
18	Survey of freshwater fish, in particular the Dolly Varden that characterizes the freshwater ichthyofauna in Shiretoko (including survey of alien species)	III, V, VIII
19	Management and measures for appropriate use	VII
20	Promotion of appropriate use and ecotourism	VII
21	Change in the number of visitors	VII
22	Survey of the number of wintering sea eagles	II
23	Survey of the Blakiston's fish-owl, including the number of breeding pairs, tagged young, dead, sick and injured individuals and their causes	III
24	Tracking of the project implementation status through preparation of annual reports	III, VII
25	Tracking of the social environment through preparation of annual reports and so on	III, VII
26	Meteorological observation	VIII

(2) Monitoring items that require cooperation from local governments, related bodies, experts, and other government agencies

No.	Monitoring items	Corresponding evaluation items
a)	Aerial observation of seasonal sea ice distribution by aircraft, satellites, and so on	I, IV, VIII
b)	Biological survey of ice algae	I, IV
c)	Tracking of changes in fish catches based on Statistics on Fisheries in Hokkaido	I, III, IV
d)	Ascertainment and assessment of walleye pollock stock (survey used to set total allowable catch [TAC])	I, IV
e)	Walleye pollock spawning survey	I, IV
f)	Number of Steller sea lions migrating to the coast of Japan, number of dead individuals due to human activities, and their sex and characteristics	I, IV, VIII
g)	Survey of damage caused by Steller sea lions	IV
h)	Survey of the reproduction status of the white-tailed eagle in their nesting sites and monitoring the number of fledglings	II, III
i)	Survey of the total number of wintering sea eagles throughout Hokkaido	II
j)	tracking of changes in fish catches compared to Hokkaido Suisan Gensei [Statistics on Fisheries in Hokkaido]	IV
k)	Killer wale survey	I, III, IV, VIII

(3) Other surveys and research

No.	Monitoring items	Corresponding evaluation items
(1)	Observation and prediction of changes in sea ice volume	*Surveys and research which provide evidence of heritage site's value by clarifying mechanisms of site's ecosystem, or contribute to the formulation of measures for specific matters, are to be proactively pursued in collaboration and cooperation with local governments, related bodies, experts, and other government agencies.
(2)	Capture, reproduction, population estimates, migration and distribution patterns of brown bears, and the status of their damage	
(3)	Survey on the current status and changes to genetic diversity of salmonids	
(4)	Survey of seasonal migration of wintering sea eagle populations and consumption of human-provided and naturally occurring food resources	
(5)	Survey of damage caused by seals	

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
I. The productivity of a unique ecosystem is being maintained	1	Observation of the water temperature and chlorophyll a using satellite remote sensing	Under consideration	Marine Area WG	Analyze MODIS data to observe the water temperature and chlorophyll a in the waters around the Shiretoko Peninsula.	Water temperature and chlorophyll a	The figures do not deviate from the long-term fluctuation range (use them as primary data to evaluate other monitoring results).
	2	Fixed-point observation of water temperature using ocean observation buoys	MOE	Marine Area WG	Install one ocean observation buoy off the coast of Utoro, Shari Town and off the coast of Konbuhama, Rausu Town, respectively, to observe the water temperature between spring and autumn.	Water temperature	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures).
	3	Seal survey	Hokkaido Prefectural Government	Marine Area WG	Conduct visual surveys from land and ocean.	Number of migrating individuals	Any serious problem is caused in the protection and management of seals (any threat of extinction is caused).
	4	Marine biota and distribution survey (shore region survey)	MOE	Marine Area WG	Conduct inventory surveys on fishes, sea algae, and invertebrates in the shore region along the coast of the Shiretoko Peninsula.	Biota, density, and distribution	The status and diversity are maintained almost at the same level as they were at the time of inscription (or as of base data).
	5	Shellfish quantitative survey in shore region	MOE	Marine Area WG	Establish 50cm x 50cm quadrats in the fixed survey points established off the coast of the Shiretoko Peninsula and record the number of individual shellfish that have appeared inside the quadrants.	Density and species composition	The status and diversity are maintained almost at the same level as they were at the time of inscription (or as of base data).
	a)	Aerial observation of seasonal sea ice distribution by aircraft, satellites, and so on	1st Regional Coast Guard Headquarters	Marine Area WG	Conduct surveys on the distribution status of sea ice.	Distribution status of sea ice	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	b)	Biological survey of ice algae	Tokai University and Hokkaido University	Marine Area WG	Comprehend the primary production biomass within the sea ice during the time the ocean is covered with sea ice.	Primary production biomass within the sea ice during the time the ocean is covered with sea ice	*It is difficult to establish an evaluation criteria at this stage because there is barely any accumulated data. Comprehending zooplankton biomass will allow to estimate a low-order food chain.
	c)	Tracking of changes in fish catches based on Statistics on Fisheries in Hokkaido	Department of Fisheries and Forestry, Hokkaido Prefectural Government	Marine Area WG	Conduct surveys on fish catches.	Fish catch	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	d)	Ascertainment and assessment of walleye pollock stock (survey used to set total allowable catch [TAC])	Fisheries Agency	Marine Area WG	Comprehend resource level and trends of walleye pollock (<i>Gadus chalcogrammus</i>).	Resource level and trends	It is generally maintained above the resource status at the time of inscription.
	e)	Walleye pollock spawning survey	Rausu Fisheries Cooperative and Kushiro Fisheries Research Institute	Marine Area WG	Conduct surveys on the spawning sites and amount of spawned eggs of walleye pollock.	Spawning sites and amount of spawned eggs	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	f)	Number of Steller sea lions migrating to the coast of Japan, number of dead individuals due to human activities, and their sex and characteristics	Hokkaido National Fisheries Research Institute, etc	Marine Area WG	Conduct surveys on the number of migrating Steller sea lions.	Number of migrating Steller sea lions	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
k)	Status of killer whales	University Alliance for Hokkaido Orca Research Project (Uni-HORP)	Marine Area WG	Conduct individual identification surveys	Number of identified individuals	Under consideration	

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
II. The interaction between marine and terrestrial ecosystems is being maintained	4	Marine biota and distribution survey (shore region survey)	MOE	Marine Area WG	Conduct inventory surveys on fishes, sea algae, and invertebrates in the shore region along the coast of the Shiretoko Peninsula.	Biota, density, and distribution	The status and diversity are maintained almost at the same level as they were at the time of inscription (or as of base data).
	5	Shellfish quantitative survey in shore region	MOE	Marine Area WG	Establish 50cm x 50cm quadrats in the fixed survey points established off the coast of the Shiretoko Peninsula and record the number of individual shellfish that have appeared inside the quadrants.	Density and species composition	The status and diversity are maintained almost at the same level as they were at the time of inscription (or as of base data).
	6	Survey of spectacled guillemot, black-tailed gull, slaty-backed gull, and Japanese cormorant populations, nesting site distribution, and number of nests	MOE	Marine Area WG	Count the number of breeding in each zone from the Utoro Port to Aidomari Port via the Shiretoko Cape. For spectacled guillemot, count the number of individuals in the ocean within the range where their population is confirmed. Also record any change in the number of nests.	Number of nests, number of colonies, and any drastic change in specific colonies	The number of nests is maintained almost at the same level as it was at the time of inscription.
	16	Survey of the brown bear population in the Shiretoko Peninsula	Relevant agencies	Sika Deer and Brown Bear WG	Collect information on the number of individuals that have died due to human activities; survey on the long-term trend of the population of brown bear (feces count survey, automatic camera survey, number of sightings from sightseeing ships, etc.)	- Number of female brown bears that have died due to human activities - Increase/decrease in the number of brown bears	- The number of female brown bears that have died due to human activities in the past five years is less than 75. - No significant decline in the number of brown bears is confirmed.
	17	Monitoring of the number of salmonids migrating upstream, spawning grounds, and spawning beds in rivers	Fosresty Agency and Hokkaido Prefectural Government	River Construction Advisory Panel	Conduct surveys on the number of parent fish migrating upstream and spawning beds to estimate the number of pink salmon migrating upstream in the Rusa River, Teppanbetsu River, and Rusa River.	Number of fish migrating upstream, number of spawning beds, and impact of river constructions on fish migrating upstream and spawning	Salmonids are migrating upstream in each river and continually reproducing. Obstacles posed to fish migrating upstream by river constructions are circumvented to the extent possible.
	22	Survey of the number of wintering sea eagles	MOE	Marine Area WG	Record the number of species, number of individuals, and whether adult or young, alongside the coastal roads on the Shiretoko Peninsula, along rivers, and on drift ice.	Number of wintering sea eagles	The status is maintained almost at the same level as it was at the time of inscription.
	h)	Survey of the reproduction status of the white-tailed eagle in their nesting sites and monitoring the number of fledglings	White-tailed eagle Monitoring Research Group	Marine Area WG	Visually comprehend the condition of the nesting sites of white-tailed eagle	Number of pairs, success rate of breeding, reproduction ability (number of fledglings per breeding pair)	The number of pairs, success rate of breeding, and reproduction ability are maintained almost at the same level as they were at the time of inscription.
	i)	Survey of the total number of wintering sea eagles throughout Hokkaido	Joint Research Group	Marine Area WG	Comprehend the number of wintering sea eagles throughout Hokkaido	Carrying capacity for the wintering sea eagles	Reference data (no criteria)

Monitoring methods for long-term monitoring items for each evaluation item

Appendix 3

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
Biodiversity is being maintained at the same level as when the site was inscribed on the World Heritage List	3	Seal survey	Hokkaido Prefectural Government	Marine Area WG	Conduct visual surveys from land and ocean.	Number of migrating individuals	Any serious problem is caused in the protection and management of seals (any threat of extinction is caused).
	4	Marine biota and distribution survey (shore region survey)	MOE	Marine Area WG	Conduct inventory surveys on fishes, sea algae, and invertebrates in the shore region along the coast of the Shiretoko Peninsula.	Biota, density, and distribution	The status and diversity are maintained almost at the same level as they were at the time of inscription (or as of base data).
	6	Survey of spectacled guillemot, black-tailed gull, slaty-backed gull, and Japanese cormorant populations, nesting site distribution, and number of nests	MOE	Marine Area WG	Count the number of breeding in each zone from the Utoro Port to Aidomari Port via the Shiretoko Cape. For spectacled guillemot, count the number of individuals in the ocean within the range where their population is confirmed. Also record any change in the number of nests.	Number of nests, number of colonies, and any drastic change in specific colonies	The number of nests is maintained almost at the same level as it was at the time of inscription.
	8	Survey of vegetation shift throughout the Shiretoko Peninsula (forest vegetation, coastal vegetation, and alpine vegetation)	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Conduct a regular vegetation survey in the fixed survey areas established throughout the Shiretoko Peninsula to comprehend the coverage, height, regeneration of the plants growing there and change in the rate of feeding traces, feeding volume, and so on of sika deer.	Forest vegetation: seedling density, lower branch density, composition and height of lower layer vegetation, rate of feeding traces and feeding volume Coastal vegetation/alpine vegetation: composition of plant community, vegetation height, rate of feeding traces, and feeding volume	Forest vegetation: The conditions existing in or before the 1980 is restored. Coastal vegetation: The conditions in or before the 1980s are maintained or restored. Alpine vegetation: The conditions in or before the 1980s are maintained.
	9	Growth and distribution surveys of the rare plant <i>Viola kitamiana</i>	MOE	Sika Deer and Brown Bear WG	Concerning the rare plants in the Shiretoko Peninsula such as <i>Viola kitamiana</i> , conduct surveys on the growth status and factors that threaten their growth in their major habitats.	Distribution of the population, number of individuals and coverage of the population monitored, and threats to them	The population of rare plants are maintained.
	11	Terrestrial invertebrate survey (mainly insects)	MOE	Sika Deer and Brown Bear WG	Use pitfall traps, box light traps, and sweeping at the existing vegetation protection fences and in the wider survey area of feeding pressures in the Shiretoko Cape, Horobetsu, Rausu and others (once every five years or so).	Entomofauna, density, distribution, and alien species distribution status	Diversity has not generally declined in comparison with the situation at the time of inscription. Non-discovery of Designated Invasive Alien Species other than the large earth bumblebee. No significant increase in the large earth bumblebee.
	12	Terrestrial bird survey	MOE	Sika Deer and Brown Bear WG	Record the species and numbers of individual birds confirmed by the line census method or spot census method.	avifauna, density, distribution, and alien species distribution status	Diversity has not generally declined in comparison with the situation at the time of inscription.
	13	Survey of small- and medium-sized mammals (including survey of alien species)	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Install automatic cameras to understand the invasion status of raccoons. At the same time, record the occurring status of other mammals.	Mammalian fauna, density, distribution, and alien species distribution status	Diversity has not generally declined in comparison with the situation at the time of inscription. Non-discovery of the raccoon.
	14	Preparation of wide-area vegetation map	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Prepare a 1:25,000 vegetation map and so forth by reading the existing vegetation maps, aerial photos, satellite images, and so on, and conducting field surveys. Compare any change in high moors, forest limits, and Japanese stone pine zones using new and old vegetation maps and so forth.	Status of plant communities and changes in high moors, forest limits, and Japanese stone pine zones.	No human-made change has been caused. No change has occurred in the distribution of high moors, forest limits, and Japanese stone pine zones.
	16	Survey of the brown bear population in the Shiretoko Peninsula	Relevant agencies	Sika Deer and Brown Bear WG	Collect information on the number of individuals that have died due to human activities; survey on the long-term trend of the population of brown bear (feces count survey, automatic camera survey, number of sightings from sightseeing ships, etc.)	- Number of female brown bears that have died due to human activities - Increase/decrease in the number of brown bears	- The number of female brown bears that have died due to human activities in the past five years is less than 75. - No significant decline in the number of brown bears is confirmed.
18	Survey of freshwater fish, in particular the Dolly Varden that characterizes the freshwater ichthyofauna in Shiretoko (including survey of alien species)	Forestry Agency	River Construction Advisory Panel	Conduct surveys on the ichthyofauna, the number of river resident type of Dolly Varden, and change in the water temperature in the Iwautetsu River and so on.	Number of Dolly Varden, status of alien species, and water temperature	The amount of resource is maintained. Eradicate alien species and minimize sighting information. No long-term rise in the water temperature in the summer.	

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
Ⅲ	23	Survey of the Blakiston's fish-owl, including the number of breeding pairs, tagged youngs, dead, sick and injured individuals and their causes	MOE	Protection and Recovery Project Review Meeting	Tag the pairs of Blakiston's fish-owls whose habitat is confirmed to identify their hatchlings. Investigate the dead, sick and injured individuals upon their discovery .	Number of pairs, breeding success rate (e.g. number of tagged youngs)	Number of pairs: Their number is maintained almost at the same level as it was at the time of inscription. Breeding success rate (number of pairs with successful breeding/number of breeding pairs confirmed): The rate is maintained almost at the same level as it was at the time of inscription.
	24	Tracking of the project implementation status through preparation of annual reports	MOE, etc.	Scientific Council (matters to be reported)	Comprehend the project implementation status by relevant institutions and various groups.	Project implementation status by relevant institutions and various groups	Reference data (no criteria)
	25	Tracking of the social environment through preparation of annual reports and so on	MOE, etc.	Scientific Council (matters to be reported)	Organize various statistics on demographics and industrial activities.	Population and number of people employed in each industry	Reference data (no criteria)
	c)	Tracking of changes in fish catches compared to Hokkaido Suisan Gensei [Statistics on Fisheries in Hokkaido]	Department of Fisheries and Forestry, Hokkaido Prefectural Government	Marine Area WG	Conduct surveys of fish catches.	Fish catch	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	h)	Survey of the reproduction status of the white-tailed eagle in their nesting sites and monitoring the number of fledglings	White-tailed eagle Monitoring Research Group	Marine Area WG	Visually comprehend the condition of the nesting sites of white-tailed eagle	Number of pairs, success rate of breeding, reproduction ability (number of fledglings per breeding pair)	The number of pairs, success rate of breeding, and reproduction ability are maintained almost at the same level as they were at the time of inscription.
	k)	Killer wale survey	University Alliance for Hokkaido Orca Research Project (Uni-HORP)	Marine Area WG	Conduct individual identification surveys	Number of identified individuals	Under consideration

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
IV. Conservation of marine ecosystems within the heritage site is being balanced with stable fishing through sustainable use of fisheries resources	1	Observation of the water temperature and chlorophyll a using satellite remote sensing	Under consideration	Marine Area WG	Analyze MODIS data to observe the water temperature and chlorophyll a in the waters around the Shiretoko Peninsula.	Water temperature and chlorophyll a	The figures do not deviate from the long-term fluctuation range (use them as primary data to evaluate other monitoring results)
	2	Fixed-point observation of water temperature using ocean observation buoys	MOE	Marine Area WG	Install one ocean observation buoy off the coast of Utoro, Shari Town and off the coast of Konbuhama, Rausu Town, respectively, to observe the water temperature between spring and autumn.	Water temperature	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures).
	3	Seal survey	Hokkaido Prefectural Government	Marine Area WG	Conduct visual surveys from land and ocean.	Number of migrating individuals	Any serious problem is caused in the protection and management of seals (any threat of extinction is caused).
	6	Survey of spectacled guillemot, black-tailed gull, slaty-backed gull, and Japanese cormorant populations, nesting site distribution, and number of nests	MOE	Marine Area WG	Count the number of breeding in each zone from the Utoro Port to Aidomari Port via the Shiretoko Cape. For spectacled guillemot, count the number of individuals in the ocean within the range where their population is confirmed. Also record any change in the number of nests.	Number of nests, number of colonies, and any drastic change in specific colonies	The number of nests is maintained almost at the same level as it was at the time of inscription.
	17	Monitoring of the number of salmonids migrating upstream, spawning grounds, and spawning beds in rivers	Fosresty Agency and Hokkaido Prefectural Government	River Construction Advisory Panel	Conduct surveys on the number of parent fish migrating upstream and spawning beds to estimate the number of pink salmon migrating upstream in the Rusha River, Teppanbetsu River, and Rusa River.	Number of fish migrating upstream, number of spawning beds, and impact of river constructions on fish migrating upstream and spawning	Salmonids are migrating upstream in each river and continually reproducing. Obstacles posed to fish migrating upstream by river constructions are circumvented to the extent possible.
	a)	Aerial observation of seasonal sea ice distribution by aircraft, satellites, and so on	1st Regional Coast Guard Headquarters	Marine Area WG	Conduct surveys on the distribution status of sea ice.	Distribution status of sea ice	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	b)	Biological survey of ice algae	Tokai University and Hokkaido University	Marine Area WG	Comprehend the primary production biomass within the sea ice during the time the ocean is covered with sea ice.	Primary production biomass within the sea ice during the time the ocean is covered with sea ice	*It is difficult to establish an evaluation criteria at this stage because there is barely any accumulated data. Comprehending zooplankton biomass will allow to estimate a low-order food chain.
	c)	Tracking of changes in fish catches based on Statistics on Fisheries in Hokkaido	Department of Fisheries and Forestry, Hokkaido Prefectural Government	Marine Area WG	Conduct surveys on fish catches.	Fish catch	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	d)	Ascertainment and assessment of walleye pollock stock (survey used to set total allowable catch [TAC])	Fisheries Agency	Marine Area WG	Comprehend resource level and trends of walleye pollock (<i>Gadus chalcogrammus</i>).	Resource level and trends	It is generally maintained above the resource status at the time of inscription.
	e)	Walleye pollock spawning survey	Rausu Fisheries Cooperative and Kushiro Fisheries Research Institute	Marine Area WG	Conduct surveys on the spawning sites and amount of spawned eggs of walleye pollock.	Spawning sites and amount of spawned eggs	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	f)	Number of Steller sea lions migrating to the coast of Japan, number of dead individuals due to human activities, and their sex and characteristics	Hokkaido National Fisheries Research Institute, etc	Marine Area WG	Conduct surveys on the number of migrating Steller sea lions.	Number of migrating Steller sea lions	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	g)	Survey of damage caused by Steller sea lions	Hokkaido Prefectural Government	Marine Area WG	Conduct surveys on damage caused by Steller sea lions to fishery	Situation of damage	*It is difficult to establish specific numerical targets as these are basic statistical data.
	j)	Analysis of oil, cadmium, mercury, etc. in seawater	Hydrographic and Oceanographic Department, Japan Coast Guard	Marine Area WG	Analyze contamination concentration on the sea surface and in seafloor deposits by oil, PCB, heavy metal, and so on	Contamination concentration on the sea surface and in seafloor deposits by oil, PCB, heavy metal, and so on	Concentration is at or below the standard figure.
k)	Status of killer whales	University Alliance for Hokkaido Orca Research Project (Uni-HORP)	Marine Area WG	Conduct individual identification surveys	Number of identified individuals	Under consideration	

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
V. Impact of river constructions has been lessened so as to maintain river ecosystems that can support salmonid species reproduction.	17	Monitoring of the number of salmonids migrating upstream, spawning grounds, and spawning beds in rivers	Fosresty Agency and Hokkaido Prefectural Government	River Construction Advisory Panel	Conduct surveys on the number of parent fish migrating upstream and spawning beds to estimate the number of pink salmon migrating upstream in the Rusha River, Teppanbetsu River, and Rusa River.	Number of fish migrating upstream, number of spawning beds, and impact of river constructions on fish migrating upstream and spawning	Salmonids are migrating upstream in each river and continually reproducing. Obstacles posed to fish migrating upstream by river constructions are circumvented to the extent possible.
	18	Survey of freshwater fish, in particular the Dolly Varden that characterizes the freshwater ichthyofauna in Shiretoko (including survey of alien species)	Forestry Agency	River Construction Advisory Panel	Conduct surveys on the ichthyofauna, the number of river resident type of Dolly Varden, and change in the water temperature in the Iwaubetsu River and so on.	Number of Dolly Varden, status of alien species, and water temperature	The amount of resource is maintained. Eradicate alien species and minimize sighting information. No long-term rise in the water temperature in the summer.
VI. Excessive influence of high sika deer population density on the ecosystem of the heritage site is not occurring.	7	Survey of vegetation change (forest vegetation and grassland vegetation) in sika deer population control area	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Establish fixed survey areas and survey lines in forest vegetation and grassland vegetation to survey the composition, vegetation rate, rate of feeding traces, and feeding volume in vegetation, flowering densities of benchmark seeds, and so on. In addition, estimate the recovery process based on surveys of the fenced-in areas from which deers are kept out.	Seedling density, lower branch density, composition and height of plant community, number of flowering roots, rate of feeding traces and feeding volume	The vegetation is restored to the status before the 1980s.
	8	Survey of vegetation shift throughout the Shiretoko Peninsula (forest vegetation, coastal vegetation, and alpine vegetation)	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Conduct a regular vegetation survey in the fixed survey areas established throughout the Shiretoko Peninsula to comprehend the coverage, height, regeneration of the plants growing there and change in the rate of feeding traces, feeding volume, and so on of sika deer.	Forest vegetation: seedling density, lower branch density, composition and height of lower layer vegetation, rate of feeding traces and feeding volume Coastal vegetation/alpine vegetation: composition of plant community, vegetation height, rate of feeding traces, and feeding volume	Forest vegetation: The conditions existing in or before the 1980 is restored. Coastal vegetation: The conditions in or before the 1980s are maintained or restored. Alpine vegetation: The conditions in or before the 1980s are maintained.
	10	Survey of sika deer status in their main wintering grounds (aerial counting survey and terrestrial counting survey)	MOE, etc.	Sika Deer and Brown Bear WG	Aerial counting survey: Fly a helicopter at low altitudes throughout the entire Shiretoko Peninsula once every five years to count the number of wintering sika deer and to record their location information. The survey has been conducted annually in some parts of the Peninsula (entire heritage area) since 2014. Terrestrial counting survey: Light census in major wintering spots, etc.	Aerial counting survey: Number of deer spotted during the wintering period (spotting density) Territorial counting survey: Number of deer spotted in each unit of distance or per indicator	Aerial counting survey: The number is controlled less than five to ten deer per square kilometer in the Shiretoko Cape district and less than five deer per square kilometer in the Horobetsu-Iwaobetsu district and Rusha-Aidomari district (the Rusha district is not included in the target area) Terrestrial counting survey: The number is controlled under the level recorded at the time a survey began in each survey area (1988 in the Horobetsu-Iwaobetsu district; 2009 in the Rusha-Aidomari district; 2007 in the Makoi district; and 2004 in the Minehama district).
	11	Terrestrial invertebrate survey (mainly insects)	MOE	Sika Deer and Brown Bear WG	Use pitfall traps, box light traps, and sweeping at the existing vegetation protection fences and in the wider survey area of feeding pressures in the Shiretoko Cape, Horobetsu, Rausu and others (once every five years or so).	Entomofauna, density, distribution, and alien species distribution status	Diversity has not generally declined in comparison with the situation at the time of inscription. Non-discovery of Designated Invasive Alien Species other than the large earth bumblebee. No significant increase in the large earth bumblebee.
	12	Terrestrial bird survey	MOE	Sika Deer and Brown Bear WG	Record the species and numbers of individual birds confirmed by the line census method or spot census method.	avifauna, density, distribution, and alien species distribution status	Diversity has not generally declined in comparison with the situation at the time of inscription.

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
VII. Recreational use of the site and other human activities are being balanced with conservation of the natural environment.	6	Survey of spectacled guillemot, black-tailed gull, slaty-backed gull, and Japanese cormorant populations, nesting site distribution, and number of nests	MOE	Marine Area WG	Count the number of breeding in each zone from the Utoro Port to Aidomari Port via the Shiretoko Cape. For spectacled guillemot, count the number of individuals in the ocean within the range where their population is confirmed. Also record any change in the number of nests.	Number of nests, number of colonies, and any drastic change in specific colonies	The number of nests is maintained almost at the same level as it was at the time of inscription.
	15	Survey of damage to human activities caused by brown bears	MOE, etc.	Sika Deer and Brown Bear WG	Collect information on damage and dangerous incidents caused by brown bears, problematic behavior by people, and the operation status of facilities through questionnaire surveys, reports by people, implementation of measures against brown bears, etc.	Number of incidents where a brown bear caused physical damage to humans; occurrence of dangerous incidents; problematic behavior by people; operation status of facilities; number of brown bear captured as harmful animals; damage to the agriculture, forestry, and fishery industries caused by brown bears.	- Incidents of hysically harm to people by brown bears are controlles. - The number of dangerous incidents arising from problematic behavior of people and dangerous incidents related to fishing activities are controlled to a total of 12 or less during a five-year period - Damages caused to agriculture in Shari Town and the affected area are reduced by 10% by JFY2020 in comparison with JFY2016
	19	Management and measures for appropriate use	MOE, etc.	Appropriate Use and Ecotourism WG	Refer to the contents of the Shiretoko White Paper, materials on the Review Meeting on Appropriate Use and Ecotourism, and the interviews conducted to administrative organs and so on to select and list management practices and measures for appropriate use.	Implementation status of management and measures	Management and measures are implemented to carry out "9. Implementing Measures" of the Shiretoko Ecotourism Strategy.
	20	Promotion of appropriate use and ecotourism	MOE, etc.	Appropriate Use and Ecotourism WG	Comprehend the status concerning the promotion of appropriate use and ecotourism based on interviews to parties involved in the use of the heritage area.	Project implementation status based on the Basic Policies of the Shiretoko Ecotourism Strategy, increase/decrease in users, change in customer segments, concerns about the natural environment	Appropriate use and ecotourism are promoted based on (1) and (2) of "5. Basic Policies" of the Shiretoko Ecotourism Strategy.
	21	Changes in the number of visitors	Relevant government agencies and business operators, etc.	Appropriate Use and Ecotourism WG	Comprehend the number of users in major user facilities through the user number count based on user counting and surveys, etc.	Number of users in each user facility	No criteria (monitoring to comprehend the actual usage status)
	24	Tracking of the project implementation status through preparation of annual reports	MOE, etc.	Scientific Council (matters to be reported)	Comprehend the project implementation status by relevant institutions and various groups.	Project implementation status by relevant institutions and various groups	Reference data (no criteria)
	25	Tracking of the social environment through preparation of annual reports and so on	MOE, etc.	Scientific Council (matters to be reported)	Organize various statistics on demographics and industrial activities.	Population and number of people employed in each industry	Reference data (no criteria)

Monitoring methods for long-term monitoring items for each evaluation item

Evaluation item	No.	Monitoring item	Implementing body	Evaluation body (WG and so on in charge)	Monitoring method	Evaluation Indicator	Evaluation Criteria
VIII. Impacts, or potential impacts of climate change are being tracked early.	1	Observation of the water temperature and chlorophyll a using satellite remote sensing	Under consideration	Marine Area WG	Analyze MODIS data to observe the water temperature and chlorophyll a in the waters around the Shiretoko Peninsula.	Water temperature and chlorophyll a	The figures do not deviate from the long-term fluctuation range (use them as primary data to evaluate other monitoring results).
	2	Fixed-point observation of water temperature using ocean observation buoys	MOE	Marine Area WG	Install one ocean observation buoy off the coast of Utoro, Shari Town and off the coast of Konbuhama, Rausu Town, respectively, to observe the water temperature between spring and autumn.	Water temperature	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures).
	3	Seal survey	Hokkaido Prefectural Government	Marine Area WG	Conduct visual surveys from land and ocean.	Number of migrating individuals	Any serious problem is caused in the protection and management of seals (any threat of extinction is caused).
	8	Understanding vegetation shift throughout the Shiretoko Peninsula (forest vegetation, coastal vegetation, and alpine vegetation)	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Conduct a regular vegetation survey in the fixed survey areas established throughout the Shiretoko Peninsula to comprehend the coverage, height, regeneration of the plants growing there and change in the rate of feeding traces, feeding volume, and so on of sika deer.	Forest vegetation: seedling density, lower branch density, composition and height of lower layer vegetation, rate of feeding traces and feeding volume Coastal vegetation/alpine vegetation: composition of plant community, vegetation height, rate of feeding traces, and feeding volume	Forest vegetation: The conditions existing in or before the 1980 is restored. Coastal vegetation: The conditions in or before the 1980s are maintained or restored. Alpine vegetation: The conditions in or before the 1980s are maintained.
	9	Growth and distribution surveys of the rare plant <i>Viola kitamiana</i>	MOE	Sika Deer and Brown Bear WG	Concerning the rare plants in the Shiretoko Peninsula such as <i>Viola kitamiana</i> , conduct surveys on the growth status and factors that threaten their growth in their major habitats.	Distribution of the population, number of individuals and coverage of the population monitored, and threats to them	The population of rare plants are maintained.
	14	Preparation of wide-area vegetation map	MOE and Forestry Agency	Sika Deer and Brown Bear WG	Prepare a 1:25,000 vegetation map and so forth by reading the existing vegetation maps, aerial photos, satellite images, and so on, and conducting field surveys. Compare any change in high moors, forest limits, and Japanese stone pine zones using new and old vegetation maps and so forth.	Status of plant communities and changes in high moors, forest limits, and Japanese stone pine zones.	No human-made change has been caused. No change has occurred in the distribution of high moors, forest limits, and Japanese stone pine zones.
	18	Survey of freshwater fish, in particular the Dolly Varden that characterizes the freshwater ichthyofauna in Shiretoko (including survey of alien species)	Forestry Agency	River Construction Advisory Panel	Conduct surveys on the ichthyofauna, the number of river resident type of Dolly Varden, and change in the water temperature in the Iwautetsu River and so on.	Number of Dolly Varden, status of alien species, and water temperature	The amount of resource is maintained. Eradicate alien species and minimize sighting information. No long-term rise in the water temperature in the summer.
	26	Meteorological observation	MOE and Forestry Agency	Scientific Council (matters to be reported)	Conduct surveys on the temperature, precipitation, insolation, snow depth at Shiretoko Pass, Cape Shiretoko, Mt. Rausu, etc.	Temperature, precipitation, insolation, snow depth	The figures do not deviate from the long-term fluctuation range (use them as primary data to evaluate other monitoring results).
	a)	Aerial observation of seasonal sea ice distribution by aircraft, satellites, and so on	1st Regional Coast Guard Headquarters	Marine Area WG	Conduct surveys on the distribution status of sea ice.	Distribution status of sea ice	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	f)	Number of Steller sea lions migrating to the coast of Japan, number of dead individuals due to human activities, and their sex and characteristics	Hokkaido National Fisheries Research Institute, etc	Marine Area WG	Conduct surveys on the number of migrating Steller sea lions.	Number of migrating Steller sea lions	None (This item is for comprehending changes in the natural environment and so on and collecting basic information to consider various measures)
	k)	Status of killer whales	University Alliance for Hokkaido Orca Research Project (Uni-HORP)	Marine Area WG	Conduct individual identification surveys	Number of identified individuals	Under consideration