Shirakami-Sanchi World Heritage Property Monitoring Plan

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Regional Liaison Committee for Shirakami-Sanchi World Heritage Property

Shirakami-Sanchi World Heritage Property Monitoring Plan

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1. Purpose of the Monitoring Plan

With respect to the beech forest of the Shirakami-Sanchi World Heritage Property (hereinafter referred to as "the Property"), it is necessary to conserve and manage its ecosystem in an adaptive manner based on scientific knowledge. Therefore, the Tohoku Regional Environment Office of the Ministry of the Environment, the Tohoku Regional Forest Office of the Forestry Agency, Aomori Prefecture, Akita Prefecture and the municipalities concerned (hereinafter referred to as "the Relevant Administrative Bodies") shall promote monitoring of the natural heritage in cooperation with universities, research institutes and other academic experts. The methods of conservation and utilization of the Property will be reviewed based on the results of the monitoring, and more effective methods will be employed for conservation management of the Property.

This monitoring plan is designed to promote adaptive conservation management* based on scientific findings, and to ensure that the ecosystem and value of the beech forest on the Property is passed on to future generation. It aims to define monitoring objectives, monitoring items and evaluation criteria for the monitoring survey to be implemented by the Relevant Administrative Bodies over the next ten year period, as well as to clarify the contents, implementation, evaluation of results and other matters concerning the monitoring.

* Adaptive conservation management: A method to manage feedback while constantly monitoring by incorporating the possibility of occurrence of situations that differ from the initial prediction into the management system in advance.

2. Objectives of Monitoring

In order to monitor whether the outstanding universal value (OUV: see Reference 1) of the Property is maintained, it is necessary to accurately identify changes in the natural environment such as climate change, changes in the social environment such as human activities, and the impact of these changes on the Property. Therefore, the objectives of monitoring have been set as follows. Based on these objectives, a range of surveys will be conducted and the items and contents will be arranged. In addition, if there are concerns about the risk of undermining the OUV, the risk factors will be identified promptly.

Monitoring Objective I	**The basic environmental conditions for meteorological, hydrological and terrestrial phenomena that sustain the beech**

	forest are identified.
Monitoring Objective II	**The forest ecosystem, mainly of the beech forest, is maintained. The effects of climate change and the signs of its effects are identified.**
Objective II-A	Highly pristine beech forests are maintained in a healthy condition over a wide area.
Objective II-B	The diversity of flora and fauna in the beech forest is adequately preserved.
Monitoring Objective III	**The OUV is managed properly, taking into account changes in social conditions surrounding the Property, so that the value at the time of its inscription on the World Heritage List is not adversely affected by human use or activities, and benefits regional development.**

3. Monitoring Items and Evaluation Criteria

Based on the monitoring objectives in 2 above, the monitoring items, specific survey items, risk/precursory phenomena that could undermine the value of the natural heritage and evaluation criteria, etc., are shown in Attached Table 1, "**Monitoring Items and Evaluation Criteria**."

Given that the evaluation criteria are used for managing risks involved in the World Heritage Property, they have been established based on efficiency and other factors, with a focus on risks that are significant in terms of their magnitude and frequency of occurrence, which could impair the value of the World Heritage.

4. Description of Survey for Each Monitoring Item

Locations, frequency, contents, and implementing body for each monitoring item (monitoring objective and specific survey item) for the Property and its surrounding area are shown in Attached Table 2, "**List of Monitoring Survey Items**."

5. Implementation of Monitoring

The implementing body of each survey shall strive to systematically conduct surveys related to the monitoring items in accordance with this monitoring plan.

In implementing the monitoring, the implementing body of each survey shall promote coordination/collaboration with the Regional Liaison Committee for Shirakami-Sanchi World Heritage Property (hereinafter referred to as "the Regional Liaison Committee"), universities, research institutes and other academic experts. Advice from the Scientific Committee for Shirakami-Sanchi World Heritage Property (hereinafter referred to as the "Scientific Committee") should also be obtained.

<Priority Surveys>

Because the monitoring plan includes a wide variety of surveys, including OUV-related surveys and high-profile surveys, surveys of particular importance ("priority surveys") have been selected from the perspective of adaptive conservation management.

* Selection criteria

(1) Closely related to OUV

(2) Closely related to evaluation criteria

(3) Likely to fluctuate in the short term

(4) Cost-effective and sustainable

The priority surveys shall be carried out appropriately and effectively through mutual coordination among the implementing bodies under detailed advice from the Scientific Committee on the methods of implementation (survey practice, sampling data, precautions, etc.).

6. Compilation and Reporting of Survey Results

The Shirakami-Sanchi World Heritage Center Nishimeya Kan, on behalf of the Regional Liaison Committee, shall solicit cooperation of the implementing bodies. It shall compile the results of their surveys after the implementing bodies have completed the surveys and clarify the findings from the surveys and their relationship with the evaluation criteria (hereinafter referred to as "monitoring results"). The monitoring results will be reported to the Scientific Committee after obtaining the approval of the Regional Liaison Committee.

7. Assessment of Monitoring Results

The Scientific Committee will evaluate and analyze the monitoring results, especially those related to the evaluation criteria, and provide advice to the Regional Liaison Committee on the conservation management of the Property.

The evaluation of monitoring results will be basically conducted about once every five years.

The Regional Liaison Committee examines the implementation or review of conservation management projects in the Property and its surrounding area, taking the advice of the Scientific Committee into account.

<Evaluation and Review>

In fiscal 2016, the results of the monitoring surveys for the previous five years were compiled, and evaluation and review of the monitoring activities were conducted taking into account the advice of the Scientific Committee. For evaluation of the monitoring survey, see Reference 3, “Evaluation Results of Shirakami-Sanchi World Heritage Property Monitoring Survey.”

8. Utilization of Monitoring Results

Monitoring results and their evaluation shall be distributed as needed to the Relevant Administrative Bodies and be made widely available to the public through the Shirakami-Sanchi World Heritage Center Nishimeya Kan. The results and evaluation will also be used by member organizations of the Regional Liaison Committee for proper management of the Property. In addition, information on rare species shall be dealt with carefully.

9. Modifications to the Monitoring Plan

This monitoring plan shall be reviewed basically every five years and may be modified by the Regional Liaison Committee based on the evaluation of the monitoring results and the advice of the Scientific Committee on conservation management of the Property.

10. Others

If the results of a survey conducted by external organizations other than the Regional Liaison Committee are determined to be necessary for evaluation, the Regional Liaison Committee will request cooperation from such external implementing organizations to allow the Committee to use their results.

The Regional Liaison Committee shall also proactively ask the external

implementing bodies to cooperate in the usage of the data.

Attached Table 1: Monitoring Items and Evaluation Criteria (1/2)

Monitoring objectives	Monitoring items				Specific survey items	Risk/precursory phenomena that could undermine the value of the natural heritage [Evaluation criteria]
	Major classification		Minor classification			
I. The basic environmental conditions for meteorological, hydrological and terrestrial phenomena that sustain the beech forest are identified.	1	Meteorological conditions	(1)	Meteorological information in the World Heritage Property and surrounding area	Atmospheric temperature, precipitation amount, amount of snow, wind direction/velocity, humidity, amount of solar radiation, etc.	Meteorological conditions change to a degree that may threaten the ecosystem, etc. of Shirakami-Sanchi, due to a rise of atmospheric temperature, frequent occurrence of heavy rain and strong wind, a decrease in the amount of snow, etc. **[There have been no reports of figures significantly exceeding average-year values due to abnormal weather, etc.]**
			(2)	Forest micrometeorology	Atmospheric temperature, ground temperature, forest humidity, maximum snow depth	
	2	Hydrological conditions	(1)	Water quality and flow rate of major rivers	Water quality (pH, turbidity, nutrient salts, chemical substances, etc.), flow rate	Hydrological conditions change to a degree that may threaten the river ecosystem of Shirakami-Sanchi, due to changes in water quality and flow rate.
	3	Geological conditions, etc.	(1)	Topographical Features	Broad-area topographical map, and the status of changes in collapsed land	Geographical conditions, etc. change to a degree that may threaten the ecosystem of Shirakami-sanchi, due to occurrence of land collapse/landslide, decreases in avalanche vegetation areas, changes in alpine vegetation area/wetland area, etc. **[Among large-scale land collapse and landslide cases, no significant natural disturbance that may affect the ecosystem has been reported.]**
			(2)	Identification of ground surface coverage and unusual topographical features of entire area	Present condition of forest, shrubland, grassland, collapsed land, development areas (roads, dams), etc.	
	4	Others	(1)	Radiation level	Status of radioactive substances	
			(2)	Agricultural chemicals	Status of use of agricultural chemicals	
II A. Highly pristine beech forests are maintained in a healthy condition over a wide area.	1	Forest structure of beech forests, etc.	(1)	Identification of changes in forests at fixed sites	Changes in individual beech growth, hierarchical structure, understory vegetation, production amount (net production, seed production, etc.)	Significant change is observed in the status of growth of beech forest, renewal conditions of beech forest, beech distribution areas, hierarchical structure, number of beech trees growing (difference between the number of withered trees and the number of promoted trees), and production volume (net production, seed production, etc.). **[No continuous and significant change has been reported with regard to growth of beech trees in the marginal part of the beech distribution area.]**
			(2)	Areawide changes in forests	Changes in forest physiognomy and vegetation	
			(3)	Genetic diversity and spatial genetic structure of beech populations	Genetic diversity and spatial genetic structure of beech populations	
	2	Impact on beech forest, etc.	(1)	Forest noxious insects and damage status	Damage *from Syntypistis punctatella* and *Venusia phasma*, occurrence of Japanese oak wilt, pine wilt, etc.	A substantial decrease in major trees constituting beech forests is observed due to occurrence/expansion of damage from noxious insects and meteorological damage. **[There has been no significant damage from**

						noxious insects in the surrounding area, and no damage has been discovered in areas where host tree species are densely growing.]
II B. The diversity of flora and fauna in the beech forest is adequately preserved.	1	Flora	(1)	Flora	Present condition of vegetation, rare plants, species that grow close to their distribution limits, *Satoyama* plants, invasive plants, etc.	Significant changes are confirmed in the plant distribution area, such as disappearance of rare plants, entry and settlement of invasive species associated with utilization, as well as regular appearance of such phenomena. **[Invasive plants have not settled in the growing area of existing vegetation.]**
			(2)	Existing vegetation	Present condition of vegetation	
			(3)	Phenology of beech forest	Phenology of budding, fruition, coloring of leaves, fallen leaves, etc.	The phenology has significantly changed due to climate change with continuous appearance of several phenomena.
	2	Fauna	(1)	Fauna	Changes in living conditions of unique species of mammals, birds, reptiles, amphibians, insects and fish	Irrecoverable changes are observed in keystone species and umbrella species (decrease in the populations of *Ursus thibetanus* and *Capricornis crispus,* animals representing the beech forest of the relevant area, decrease in population and reproductive rate of rare birds (in particular, *Aquila chrysaetos, Dryocopus martius, Histrionicus historionicus*, among others)). **[No significant change has been observed in the population of large mammals. The reproductive rate of birds of prey has not declined continuously.]**
			(2)	Living conditions of endangered species	Changes in living conditions of *Dryocopus martius*, *Aquila chrysaetos* and *Nisaetus nipalensis*	
			(3)	Invasive animals	Habitats of *Cervus nippon*	Deterioration and simplification of vegetation are observed associated with invasion of *Cervus nippon* into the Heritage Property. **[There have been no reports on living and settlement of *Cervus nippon* in municipalities around the Heritage Property]**
			(4)	Impact on animals	Occurrence status of infectious diseases	
	3	Fungi	(1)	Survey on distribution of fungi	Condition of soil fungus, yeast, lactobacillus, actinomycete, etc.	Irreversible changes are observed in the environment, such as changes in the composition of soil fungus due to acid precipitation and changes in the composition of specific fungi due to climate change.

Attached Table 1: Monitoring Items and Evaluation Criteria (2/2)

Monitoring objectives	Monitoring items				Specific survey items	Risk/precursory phenomena that could undermine the value of the natural heritage [Evaluation criteria] Corrections are indicated in red.
	Major classification		Minor classification			
III. The OUV is managed properly, taking into account changes in social conditions surrounding the Property, so that the value at the time of its inscription on the World Heritage List is not adversely affected by human use or activities, and benefits regional development.	1	Usage environment	(1)	Number of visitors	Number of visitors	Significant alterations of the ecosystems by humans and decline in heritage preservation awareness are observed, such as expansion of mountain trails, contamination of river water, and frequent occurrence of various illegal acts (damaging trees, collecting plants, fishing in mountain streams, making fires). **[No malicious illegal acts or violation of manners, and no rapid increase in the number of users have been reported.]**
			(2)	Present status of use of major trails	Present status of use of major trails	
			(3)	User manners	Condition of guideposts, tape, paint, remaining graffiti, etc.	
	2	Contribution to regional development	(1)	Number of users of facilities at conservation and utilization sites, etc.	Number of users of facilities at conservation and utilization sites, etc.	Facilities at conservation and utilization sites are not utilized and no initiatives to raise the heritage value, such as the awareness raising activities, have been implemented. **[Decreasing trends have not been seen in the number of users of facilities at conservation and utilization sites, the number of awareness-raising activities related to heritage value, and the number of environmental education activities]**
			(2)	Environmental education and awareness raising	Status of environmental education and awareness raising using World Natural Heritage	
	3	Social environment surrounding the Heritage Property	(1)	Status of local areas	Total population, depopulation, population by industry	There is a risk of the disappearance of folk knowledge, such as use of mountain vegetables and hunting

Attached Table 2 List of Monitoring Survey Items (1/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
I. The basic environmental conditions for meteorological, hydrological and terrestrial phenomena that sustain the beech forest are identified.	1 Meteorological conditions	(1) Meteorological information in the World Heritage Property and surrounding area	Atmospheric temperature, precipitation amount, amount of snow, wind direction/velocity, humidity, amount of solar radiation, etc.	MOE	Meteorological observation survey in Shirakami-Sanchi World Heritage Property and its surrounding area	From 1998	Every year	To be continued	Ridge area of Mt. Kushiishi, Futatsumori, Nishimeya-mura	Atmospheric temperature, ground temperature, precipitation amount, snow depth, wind direction/velocity, amount of solar radiation, humidity, atmospheric pressure	✓
				Hirosaki Univ.	Meteorological observation in Shirakami-Sanchi World Heritage Property and its surrounding area	From 2009	Every year	To be continued	Okuakaishi Forest Road, Shirakami Natural Science Park	Precipitation amount, atmospheric temperature, humidity, atmospheric pressure, wind direction/velocity, snow depth, CO_2 concentration	
				Tsugaru Dam		1990 to 2006			Tsugaru Dam catchment area and its surrounding area	Atmospheric temperature, humidity, wind velocity	
				Forestry	On-site survey, etc. of the monitoring program on the impact of climate change on the forest ecosystem of the World Heritage Property	From 2010	Every year	To be continued	Area near the peak of Mt. Kodake, area near Juniko	Atmospheric temperature, ground temperature, maximum snow depth (Program to examine measures for adaptation to the impact of climate change in the forest ecosystem of the World Heritage Property)	✓
				Others	AMeDAS data	From 1976	Every year	To be continued	Fukaura, Ajigasawa, Dake, Hachimori, Fujisato		
		(2) Forest micrometeorology	Atmospheric temperature, ground temperature, forest humidity, maximum snow depth	Survey Committee, MOE	World Heritage Shirakami-Sanchi Beech Forest Monitoring Survey	From 1999	Every year	To be continued	3 locations around Mt. Kushiishi (Ridge site, *Dryocopus martius* site, Yanadaki Site)	Atmospheric temperature, ground temperature, humidity (micrometeorology)	
				Forestry	Survey on long-term changes in virgin beech forest in the Shirakami-Sanchi World Heritage Property	From 1998	Every year	To be continued	Yanadaki-no-Sawa testing site, Kasuge River source area testing site	Forest atmospheric temperature, maximum snow depth (micrometeorology)	
	2 Hydrological conditions	(1) Water quality and flow rate of major rivers	Water quality (pH, turbidity, nutritive salts, chemical substances,	Tsugaru Dam	Tsugaru Dam Assessment Survey	1990 to 2006			Tsugaru Dam catchment area and its surrounding area	Water quality (including chemical substances), flow rate	

			etc.), flow rate								
	3 Geological conditions, etc.	(1) Topographical features	Broad-area topographical map, and the status of changes in collapsed land	Forestry	Survey on topographical changes in Shirakami-Sanchi World Heritage Property	2003, 2011	Once as basic information	Completed	Airplane measuring range (2×3 km)	Preparation of a broad-area topographical map using DTM (digital terrain model) data	
		(2) Identification of ground surface coverage and unusual topographical features of entire area	Present condition of forests, shrubland, grassland, collapsed land, development areas (roads, dams), etc.	Forestry	Survey on topographical changes in Shirakami-Sanchi World Heritage Property (reposted)	2003, 2011	Once/10 years or upon detecting a large-scale land collapse or other change	To be continued	3,000 ha of the Heritage Property	Identification of beech forest and other community distribution, dynamics of shrubberies, alpine vegetation, wetland areas, etc., identification of gaps, etc.	
	4 Others	(1) Radiation level	Status of radioactive substances	Aomori, Akita		None				Measuring air radiation levels outside the Heritage Property	
		(2) Agricultural chemicals	Status of use of agricultural chemicals	Aomori, Akita		None				Standards for use are determined in Agricultural Pest Control Guidelines.	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (2/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
II A. Highly pristine beech forests are	1 Forest structure of beech	(1) Identification of changes in forests at fixed sites	Changes in individual beech growth, understory vegetation,	Survey Committee, MOE	World Heritage Shirakami-Sanchi Beech Forest Monitoring Survey (reposted)	From 1999	Every year	To be continued	3 locations around Mt. Kushiishi (Ridge site, Dryocopus martius site, Yanadaki Site)	Monitoring survey of trees, shrubs, bamboo grass and seedlings, survey on the amount of supply of litter and seeds	✓

maintained in a healthy condition over a wide area.	forests, etc.		production amount (net production, seed production, etc.)	Forestry	Survey on long-term changes in virgin beech forest in the Shirakami-Sanchi World Heritage Property (reposted)	From 1998	Every year	To be continued	Yanadaki-no-Sawa testing site, Kasuge River source area testing site	Every tree survey (adding new trees), canopy projection drawing, survey on trees with collapsed canopy, forest floor vegetation survey	✓
				Hirosaki Univ.	Shirakami-Sanchi Takakura Woods survey area	From 2009	Every year	To be continued	Takakura Woods survey area (1.4 ha)	Every tree survey, survey on community structures of young trees/seedlings, survey on the amount of supply of litter and seeds (for litter, sampling only)	
				Iwasaki Junior High School	Juniko Beech Forest Monitoring	From 2005	Every year	To be continued	Beech forest near Juniko Aoike (50 x 50 m)	Monitoring survey of trees, shrubs, and seedlings, survey on the amount of supply of litter and seeds	
				Forestry (Agency)	Basic Survey on Diversity of Forest Ecosystems	2007	Once/5-10 years	2012-2017	0.1 ha grid points of 4 km mesh in Aomori and Akita prefectures (circular, rectangular)	Every tree survey, root cutting survey, fallen tree survey, understory vegetation, soil erosion survey (Basic Survey on Diversity of Forest Ecosystems)	
				Forestry	Comprehensive survey on Shirakami-Sanchi forest management operations 1986	1984 to 1985	Once/10 years	To be determined	6 forest stands in Kasuge River basin, 8 forest stands in Akaishi River basin	Calculation of the numbers of standing trees and withered/damaged trees, beech forest stand volume per ha	
				MOE	Report on study concerning the establishment of a monitoring technique for preservation of the forest ecosystem of the Shirakami-Sanchi World Heritage Property, and forest management to ensure harmonization with forest use of the peripheral area	1998 to 2002	Once/5-10 years	Completed	Beech forest on the southern slope of Futatsumori (beech forest in high elevation area)	Every tree survey, understory vegetation survey	
				Forestry	On-site survey, etc. of the monitoring program on the impact of climate change on the forest ecosystem of the World Heritage Property	2011	Once/5-10 years	To be determined	Area near Juniko (beech forest in low elevation area)	Every tree survey, understory vegetation survey	
				Forestry	Protected forest monitoring survey operations and assessment	2010, 2011, 2015	Once/5 years	To be continued	Shirakami-Sanchi forest ecosystem protected areas	Protected forest monitoring: forest surveys (every tree survey, vegetation survey, fixed-point photo taking, flora	

					operations				(Aomori and Akita Prefectures)	survey)	
				Forestry	Monitoring survey of vertically distributed vegetation in Shirakami-Sanchi World Heritage Property, etc.	2012 to 2013	Once/5-10 years	2018	Shirakamidake, Takakuramori, Futatsumori, Kodake	Survey by elevation (monitoring survey of vertically distributed vegetation), maintenance of piles indicating plot positions	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (3/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
II A. Highly pristine beech forests are maintained in a healthy condition over a wide area.	1 Forest structure of beech forests, etc.	(2) Areawide changes in forests	Changes in forest physiognomy	Forestry	Gathering of aerial photographs, etc.	2000 to 2010	Once/5 years	To be continued	Entire Shirakami-Sanchi area	Gathering of satellite images or aerial photographs	
				Forestry	Survey on topographical changes in Shirakami-Sanchi World Heritage Property (reposted)	2003, 2011	Once/10 years or upon detecting a large-scale land collapse or other change	To be continued	3,000 ha of the Heritage Property	Changes in wide-area avalanche vegetation and tree height	
		(3) Genetic diversity and spatial genetic structure of beech populations	Genetic diversity and spatial genetic structure of beech populations	Hirosaki Univ.	Genetic structures of vegetation and beech forests seen in diverse topographical features of Takakuramori	2004 to 2005	Completed	Completed	Takakuramori	Analysis of genetic diversity and spatial genetic structure of beech populations	

	2 Impact on beech forests, etc.	(1) Forest noxious insects and damage status	Damage *from Syntypistis punctatella* and *Venusia phasma*, occurrence of Japanese oak wilt, pine wilt, etc.	Forestry	Forestry patrol by staff members (Survey on damaged trees)	From 2012	Every year	To be continued	Heritage Property and neighboring areas of Heritage Property	Identification of forest noxious insects and weather-related damage on beech forests and trees composing beech forests, etc., such as *Quercus crispula* and *Pinus parviflora var. pentaphylla*, and integrated recording of locations of damaged trees, description of countermeasures, and information on occurrence of noxious insects	
				Aomori	Airborne survey on forest damage by noxious insects	From 2011	Every year	To be continued	Forests along the coast of Sea of Japan in areas from Ajigasawa-machi through Fukaura-machi	Conducting aerial survey of withered and dead trees, etc. by prefectural disaster helicopters twice a year in June and September	
				Akita	Airborne survey on forest damage by noxious insects	From 2012	Every year	To be continued	Forests along the coast of Sea of Japan in areas from Happo-cho through Noshiro City	Identification of damage by forest noxious insects such as Japanese oak wilt and pine wilt by prefectural disaster helicopters	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (4/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
II B. The diversity of flora and fauna in the beech forest is adequately preserved.	1 Flora	(1) Flora	Present condition of rare plants, species that grow close to their distribution limits, *Satoyama* plants, invasive plants, etc.	MOE	Shizukagoten Vegetation Survey	2002 to 2016	Every 5 years	To be continued	Shizukagoten (Northern ridge line of Mt. Mukaishirakamidake)	From 2002 to 2007, checking during patrol in the operations of Shirakami-Sanchi Natural Environment Preservation Area natural environment survey operations, etc. From 2008 to 2010, vegetation survey by staff. In 2011, Shirakami-Sanchi Natural Environment Preservation Area flora survey operations	
				MOE	Natural Environment Preservation Basic Survey (Specific plant community survey)	1978, 1988, 1997, 2011	Once/10 years	To be continued	Specific plant communities (23 locations)	In 2011, conducted follow-up survey in the Shirakami-Sanchi Natural Environment Preservation Area flora survey operations	
				Aomori	Academic survey on the Shirakami-Sanchi Heritage Property Peripheral Ecosystem, etc.	2004, 2005	Completed	To be determined	Akaishi River area, Takakuramori and Anmon-no-Taki area, Okawa River area, Oirase River and Sazanai River area, Juniko and Shirakamidake area, Mini-Shirakami area, major flow areas of Shirakami-Sanchi, mountain peak, ridge lines	On-site survey on flora and rare plants	
				Aomori	Survey on soil hardness and erosion condition on mountain trails of Shirakami-Sanchi	2009 to 2011	Completed	To be determined	Nature observation road, Anmon-no-Taki trail and beech forest walking trail, Tohoku nature trail, Juniko trail	Survey on growing condition of invasive plants (*Plantaginaceae*, etc.), survey on escaped plants (cover degree, species name), interview survey on plants that have disappeared or decreased	
				Forestry	Survey for identification of actual conditions in Shirakami-Sanchi World Heritage Property	2001 to 2010	Once/5-10 years	To be determined	Scheduled routes for actual conditions identification survey (established trails, designated routes	Recording of rare plants and invasive plants (*Satoyama* vegetation) using GPS, interview survey	

									, related routes)		
				Forestry	Monitoring program on the impact of climate change on the forest ecosystem of the World Heritage Property	2010 to 2012	To be determined	To be continued	Area near the peak of Mt. Kodake (several locations)	*Pinus pumila* communities (identifying distribution of *Pinus pumila* by aerial photographs)	
		(2) Existing vegetation	Present condition of vegetation	MOE	Natural Environment Preservation Basic Survey (Vegetation survey)	1981, 1985, 2012	Once/10 years	To be determined	Entire Heritage Property	Vegetation survey, drawing existing vegetation map	
		(3) Phenology of beech forest	Phenology of budding, fruition, coloring of leaves, fallen leaves, etc.	MOE	Survey on phenology of beech forests in the Shirakami-Sanchi World Heritage Property	From 2009	Every year	To be continued	Ridge area of Mt. Kushiishi	Phenology survey of beech trees, etc. (with stationary camera)	
				Forestry	Survey on long-term changes in virgin beech forest in the Shirakami-Sanchi World Heritage Property (reposted)	From 2013	Every year	To be continued	Yanadaki-no-Sawa testing site, Kasuge River source area testing site	Phenology survey of beech trees, etc. (added to the objectives of survey by year-round camera)	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (5/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
II B. The diversity of flora and fauna in the beech forest is adequately preserved	2 Fauna	(1) Fauna	Changes in living conditions of unique species and species approaching distribution limits of mammals, birds, reptiles, amphibians,	MOE	Report on study concerning the establishment of a monitoring technique for preservation of the forest ecosystem of the Shirakami-Sanchi World Heritage Property, and forest management to ensure harmonization with forest use of the peripheral area (reposted)	1998 to 2002	Completed	To be determined	Middle part of southern slope of Mt. Kushiishi, northern foot of Futatsumori (Tomari-no-Tai)	Survey on medium and large-sized mammals, small mammals, birds, reptiles and amphibians, insects, and soil animals	

.			insects and fish	Forestry	Survey for identification of actual conditions in Shirakami-Sanchi World Heritage Property (reposted)	2001, 2009, 2010	Once/5-10 years	To be determined	Scheduled routes for actual conditions identification survey (established trails, designated routes, related routes)	Survey on medium and large-sized mammals, survey on birds (recording of identified locations)	✓
				Akita		2002 to 2005	Completed	To be determined	Mase River, etc.	Fish (*Salvelinus leucomaenis*) Survey	
				Forestry	Protected forest monitoring survey operations and assessment operations (reposted)	2010, 2011	Once/5 years	To be continued	Shirakami-Sanchi forest ecosystem protected areas (Aomori and Akita Prefectures)	Protected forest monitoring: fauna survey (mammals, insects)	
				MOE	Monitoring Sites 1000 (terrestrial birds survey)	2009 (Tengudake) 2006, 2011 (Juniko) 2007, 2012 (Dakedai)	Once/5 years	To be continued	Tengudake, Juniko, Dakedai	Birds fixed-point survey	
				MOE	Survey on medium and large-sized mammals in Shirakami-Sanchi	From 2013	Every year	To be continued	Heritage Property and its surrounding area (around 26 points)	Stationary camera survey for identification of medium and large-sized mammals	✓
				Forestry	Surveillance camera survey of *Cervus nippon* around the Shirakami-Sanchi World Heritage Property (Aomori Prefecture side), sensor camera survey in the Shirakami-Sanchi World Heritage Property and its surrounding area (Akita Prefecture side)	From 2014	Every year	To be continued	Surrounding area (around 52 points)	Stationary camera survey for identification of medium and large-sized mammals	✓

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (6/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
II B. The diversity of flora and fauna in the beech forest is adequately preserved.	2 Fauna	(2) Living conditions of endangered species	Changes in living conditions of *Dryocopus martius*, *Aquila chrysaetos* and *Nisaetus nipalensis*	MOE	Shirakami-Sanchi Natural Environment Preservation Area *Dryocopus martius* living conditions information survey operations	1998 to 2002, 2014	To be determined	To be continued	Middle part of southern slope of Mt. Kushiishi, entire Heritage Property and its surrounding area (each flow area of Sazanai, Oirase, Akaishi, Nakamura, and Anmon rivers, etc.)	Confirmation of living conditions of *Dryocopus martius* (interview survey), on-site survey	✓
				Forestry	Survey on living conditions of *Dryocopus martius* around Shirakami-Sanchi	1996, 2008	Completed	To be determined	Heritage Property and its surrounding area	Confirmation of living conditions of *Dryocopus martius*	
				MOE	Patrol by National Wildlife Protection Area rangers	From 2006	Every year	To be continued	Heritage Property and its surrounding area	Gathering of information by National Wildlife Protection Area rangers, etc.	
				Dam		1990 to 2006	Completed	Unknown	Tsugaru Dam catchment area and its surrounding area (Anmon River basin), entire Heritage Property and its surrounding area	Tsugaru Dam Assessment Survey	
				MOE	Shirakami-Sanchi *Aquila chrysaetos* living conditions survey operations	2013, 2016	Once/3 years	To be continued	5 locations on Aomori side, 4 locations on Akita side	Survey on living conditions and reproductive rate of birds of prey, such as *Aquila chrysaetos* and *Nisaetus nipalensis* (survey continuously conducted every year since 1997 by Aomori Golden Eagle Survey Team)	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (7/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
II B. The diversity of flora and fauna in the beech forest is adequately preserved.	2 Fauna	(3) Invasive animals	Habitats of *Cervus nippon*	Aomori		From 2005	Every year	To be continued	Surrounding area	Gathering information	
				Akita		From 2009	Every year	To be continued	Surrounding area	Gathering information	
				MOE	Survey on medium and large-sized mammals in Shirakami-Sanchi (reposted)	From 2013	Every year	To be continued	Heritage Property, surrounding area	Fixed-point survey with automatic cameras	
				Forestry	Surveillance camera survey of *Cervus nippon* around the Shirakami-Sanchi World Heritage Property (Aomori Prefecture side), sensor camera survey in the Shirakami-Sanchi World	From 2014	Every year	To be continued	Surrounding area	Fixed-point survey with automatic cameras	

					Heritage Property and its surrounding area (Akita Prefecture side) (reposted)						
				Aomori	*Cervus nippon* monitoring automatic camera installation program	From 2015	Every year	To be continued	Surrounding area	Fixed-point survey with automatic cameras	
				Others	Installation of automatic cameras	2017 to 2020	Once	Since 2017	Surrounding area	Fixed-point survey with automatic cameras Project commissioned by Agriculture, Forestry and Fisheries Research Council Conducted by Forestry and Forest Products Research Institute	
				Others	Eyewitness information gathering using ICT	From 2017	To be determined	Since 2017	Surrounding area	Gathering of eyewitness information using various mobile phone terminals Project commissioned by Agriculture, Forestry and Fisheries Research Council Conducted by Forestry and Forest Products Research Institute	
				Others	Feces collection survey and analysis	2017 to 2020	To be determined	Since 2017	Surrounding area	Collecting feces to identify spices and sex from DNA Project commissioned by Agriculture, Forestry and Fisheries Research Council Conducted by Forestry and Forest Products Research Institute	
				MOE	*Cervus nippon* handling operations	From 2015	Every year	To be continued	Surrounding area	Light census	
				MOE	*Cervus nippon* feces identification survey	From 2016	Every year	To be continued	Surrounding area	Collecting feces to identify spices from DNA	
		(4) Impact on animals	Occurrence status of infectious diseases	Aomori, Akita		As necessary	Every year	To be continued	Surrounding area	Collecting information on infection and spread of infectious diseases to wildlife in surrounding area	
	3 Fungi	(1) Survey on distribution of fungi	Soil fungus such as symbiotic/wood-destroying fungi	Others	None			To be determined	Along major Shirakami-Sanchi routes	Gathering information on soil fungus such as symbiotic/wood-destroying fungi	
			Condition of soil fungus,	Akita	None			To be determ	Kasuge River source area,	Collection and storage of yeast, lactobacillus, actinomycete, and other	

			yeast, lactobacillus, actinomycete, etc.					ined	Shirakami-Sanchi foothills area	fungi	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Attached Table 2 List of Monitoring Survey Items (8/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
III. The OUV is managed properly, taking into account changes in social conditions surrounding the Property, so that the value at the time of its inscription on the World Heritage List is	1 Usage environment	(1) Number of visitors	Number of visitors	MOE	Survey on the number of visitors to Shirakami-Sanchi World Heritage Property and surrounding area	From 2004	Every year	To be continued	9 locations on Aomori side, 4 locations on Akita side	Setting visitor counters at the entrance of walking trails	✓
				Forestry	Survey on long-term changes in virgin beech forest in the Shirakami-Sanchi World Heritage Property (reposted)	From 2010	Every year	To be continued	12 locations on Aomori side	Installing automatic cameras and identifying from images	
		(2) Present status of use of major trails	Present status of use of major trails	Aomori	Survey on soil hardness and erosion condition on mountain trails of Shirakami-Sanchi	2009 to 2011	Once/5 years	To be determined	Nature observation road, Anmon-no-Taki trail and beech forest walking trail, Tohoku nature trail, Juniko trail	Survey on status of use of trails	
				Forestry	Protected forest monitoring survey operations and assessment operations (reposted)	2010, 2011	Once/5-10 years	To be continued	Shirakami-Sanchi forest ecosystem protected areas (Shirakamidake)	Protected forest monitoring: use dynamics survey (survey on the number of users, user actual conditions survey, taking fixed-point photographs)	
		(3) User manners	Condition of guideposts, tape, paint,	All	Joint patrol		Every year	To be continued	Entire World Heritage Property		

not adversely affected by human use or activities, and benefits regional development.			remaining graffiti, etc.	MOE, Forestry, Aomori, Akita	Patrolling by patrol officers, staff members, etc.	From 1992	Every year	To be continued	Entire World Heritage Property	Patrolling by GSS, patrol officers of MOE, patrol officers commissioned by the Prefecture, patrolling by staff members	
				Forestry	Survey for identification of actual conditions in Shirakami-Sanchi World Heritage Property (reposted)	2001, 2009, 2010	Once/5-10 years	To be determined	Scheduled routes for actual conditions identification survey (established trails, designated routes, related routes)	Patrolling by staff members, etc. (installing road signs, identifying the status of remaining items left, etc.)	

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Attached Table 2 List of Monitoring Survey Items (9/9)

Monitoring objectives	Monitoring items		Specific survey items	Implementing organization*	Survey name	Survey year	Survey frequency	Subsequent years	Survey locations	Survey items	Priority survey
III. The OUV is managed properly, taking into account changes in social conditions	2 Contribution to regional development	(1) Number of users of facilities at conservation and utilization sites, etc.	Number of users of facilities at conservation and utilization sites, etc.	Aomori, Akita, municipalities	Survey on present condition of conservation and utilization sites	From 2003	Every year	To be continued	Akaishi River area, Takakuramori and Anmon-no-Taki area, Okawa River area, Oirase River and Sazanai River area, Juniko and Shirakamidake area,	Statistics of tourist visitors	

surrounding the Property, so that the value at the time of its inscription on the World Heritage List is not adversely affected by human use or activities, and benefits regional development.									Mini-Shirakami area		
		(2) Environmental education and awareness raising	Status of environmental education and awareness raising using World Natural Heritage	MOE	Shirakami-Sanchi Children Park Ranger Project	1999 to 2016	Completed	Completed	World Heritage Property and its surrounding municipalities	Nature experience camp, etc. in the Shirakami-Sanchi surrounding area for children in the 3rd grade in elementary school to 3rd grade in junior high school	
				MOE	Nishimeya Elementary School integrated study	From 2008	Every year	To be continued	Nishimeya-mura	Environmental education regarding Shirakami-Sanchi at local elementary schools	
				MOE	Shirakami-Sanchi usage conditions survey	From 2016	Once/5-10 years	To be continued	World Heritage Property and its surrounding municipalities	Targeting relevant organizations in surrounding municipalities, etc., identifying the number of guides working in Shirakami-Sanchi and status of learning at schools	
	3 Social environment surrounding heritage	(1) Status of local areas	Total population, population by industry	Others	National census	1920 to 2010	Once/5 years	2020	Municipalities	Analysis of regional population and depopulation, identification of actual conditions of workers by industry, mainly primary industry	✓
				Others	Identification and examination of actual conditions regarding daily utilization by regional residents	To be determined	To be determined	To be determined	World Heritage Property and its surrounding municipalities	Examining the method of identifying present conditions regarding daily utilization, such as use of mountain vegetables and hunting, as well as the implementing bodies (museums, schools, etc.)	

* Implementing organizations → MOE: Ministry of the Environment, Forestry: Forestry Agency (Tohoku Regional Forest Office), Aomori: Aomori Prefecture, Akita: Akita Prefecture, Survey Committee: Beech Forest Monitoring Survey Committee, Hirosaki Univ.: Hirosaki University

Reference

Outstanding Universal Value (OUV) of the Shirakami-Sanchi World Heritage Property

January 31, 2011

To be submitted to the World Heritage Committee

a. Overview

Situated in the mountains at an altitude of 200 to 1,250 m above sea level and along the Sea of Japan in northern Honshu, Shirakami-Sanchi is a wilderness area with the largest remaining virgin beech forest in East Asia. The World Heritage Property contains the remnant of the cool-temperate beech forests that covered the hills and mountain slopes of northern Japan some eight to twelve thousand years ago.

Beech forests currently distributed across Europe, East Asia and North America are thought to have originated from circumpolar vegetation prior to the last glacial period. As the beech forests shifted their distribution from the circumpolar region to the south in the last glacial period, the southward shift was blocked by mountainous areas stretching east to west, resulting in simplified vegetation represented by many of the current beech forests. On the other hand, the beech forests in the Shirakami-Sanchi contain many elements of Tertiary Peri-Arctic flora, since vegetation originating in the circumpolar region, including beech, which retreated to southern Japan during the glacial period without being blocked in its southern migration, has re-expanded its distribution since the late glacial period.

Reflecting the distinct heavy-snow environment of the inland areas along the Sea of Japan, a rare climatic condition in the world, Shirakami-Sanchi has forests of monodominant *Fagus crenata*, a species endemic to Japan. A unique plant community with diverse flora, including undergrowth dominated by evergreen *Sasa kurilensis* has been formed.

Shirakami-Sanchi is also a habitat for rare bird species such as the black woodpecker (*Dryocopus martius*), and large mammals such as the Japanese serow (*Capricornis crispus*) and Japanese black bear (*Ursus thibetanus japonicus*), which requires a diverse forest environment including old-growth forest. These and other species are all interacting as functional elements of the ecosystem of the climax beech forest.

b. Attestation of satisfying the selection criteria

Criterion (ix) (Ecosystem)

Shirakami-Sanchi is a virtually undisturbed, pristine climax forest dominated by Fagus that escaped simplification of vegetation during the earths' glacial stages by shifting its distribution towards the south. Its extent is the largest in East Asia, one of

the distributional ranges where Fagus is dominant in the cool-temperate forests of the northern hemisphere. Its forest ecosystem reflects the history of global climate changes and the heavy-snow environment, and is an outstanding example of ongoing processes in the development and succession of communities of plants together with the animals that depend on them.

Shirakami-Sanchi is thus very important for studies on terrestrial cool-temperate ecology, particularly on Eurasian beech forest ecosystem processes, and for long-term monitoring of climate and vegetation changes.

c. Integrity

The Property contains a large pristine, non-fragmented beech forest. Many of Japan's beech forests were replaced in the past by planted forests, such as of cedar plantations. However, the topography of the Property is generally steep and this has preserved a pristine environment that has been virtually unaffected by human activities. The Property includes all the elements necessary to maintain the ecosystem function of the beech forest. The Property has an area of 16,971 ha, which is of an adequate size to ensure the long-term existence of the beech forest ecosystem.

e. Protection and management requirements

The entire expanse of the Property consists of national forests owned and managed by the national government. The Property is designated by law as Shirakami-Sanchi Nature Conservation Area, Tsugaru Quasi-National Park and other National Parks, Shirakami-Sanchi National Wildlife Protection Area and Shirakami-Sanchi Forest Ecosystem Reserve. The laws and systems to grant these statuses are designed to preserve Japan’s outstanding natural environment and impose strict legal regulations on development and other activities. In addition, to provide legal protection, the Japanese serow is designated as a Special Natural Monument, while the golden eagle, mountain hawk-eagle and black woodpecker are designated as National Endangered Species of Wild Fauna and Flora and/or Natural Monuments. The Ministry of the Environment, the Forestry Agency and the Agency for Cultural Affairs, which enforce the respective systems, jointly formulated the Shirakami-Sanchi World Heritage Property Management Plan. In line with the plan, the Property is managed in an integrated manner so as to facilitate smooth management of these areas and species, which have been designated for protection by different levels of governments. Local offices of the competent ministries and relevant local governments have established the Regional Liaison Committee for Shirakami-Sanchi World Heritage Property to promote conservation management of the Property through coordination and

collaboration with the local community. They have also established the Scientific Committee for Shirakami-Sanchi World Heritage Property, comprised of academic experts, to promote the adaptive conservation management of the Property.

Based on the conservation status survey by IUCN (1997), new member organizations joined the Regional Liaison Committee. Currently, municipalities are also involved in discussions and are playing a role in the management of the Property, including information dissemination, awareness raising, user guidance, and facility maintenance.

Reference 2

Charter of the Scientific Committee for Shirakami-Sanchi World Heritage Property

(Purpose)

Article 1 The Scientific Committee for Shirakami-Sanchi World Heritage Property comprised of academic experts shall be established with the aim of understanding the natural environment of the Shirakami Mountains (Shirakami-Sanchi), which are inscribed on the World Natural Heritage List, and to give necessary advice to the Regional Liaison Committee for Shirakami-Sanchi World Heritage Property on adaptive management based on scientific data.

(Issues to be considered)

Article 2 The Scientific Committee shall consider the following issues as necessary.

(1) Issues relating to conservation management of the Shirakami-Sanchi World Heritage Property

(2) Issues relating to survey, research and monitoring for (1) above

(3) Other issues necessary to achieve the purpose

(Membership)

Article 3 The Scientific Committee shall consist of the following members, secretariat and observers.

(1) Members

Academic experts

(2) Secretariat

Administrative bodies stipulated in Article 6

(3) Observers

Any other person involved in conservation management

(Members)

Article 4

1 Members of the Scientific Committee shall be appointed by the head of the directorate of the secretariat from among the academic experts.

2 The term of office of the committee members shall be three years. However, reappointment shall not be precluded.

3 In the case of replacement or increase in the number of committee members, the term of office shall be the same as the remaining term of office of the other committee members.

(Operation)

Article 5

1 The Chair of the Committee shall convene and conduct the proceedings.

2 The Vice-Chair shall assist the Chair in the proceedings.

3 The Chair and Vice-Chair shall be elected by the committee members from among themselves.

4 The Chair may request academic experts other than committee members to attend committee meetings as necessary.

5 The Committee may establish subcommittees or working groups under the Committee to further its consideration of important issues.

6 Meetings of the Committee shall, in principle, be open to the public, but may be closed to the public at the discretion of the Chair.

(Secretariat)

Article 6 The secretariat of the Committee shall be comprised of the Tohoku Regional Environmental Office of the Ministry of the Environment, the Tohoku Regional Forest Office of the Forestry Agency, the Aomori Office of the Forestry Agency Tohoku Regional Forest Office, Aomori Prefecture, Akita Prefecture, the Aomori Prefectural Board of Education, and the Akita Prefectural Board of Education. Directors of the secretariat shall rotate between the Tohoku Regional Environmental Office of the Ministry of the Environment and the Tohoku Regional Forest Office of the Forestry Agency.

(Others)

Article 7

1. The Committee shall provide advice to the Regional Liaison Committee for Shirakami-Sanchi World Heritage Property to facilitate the proper management of the World Heritage Property.

2. Issues not specified above and necessary for the Committee's operation shall be set forth separately.

(Supplementary provisions)

1 This charter shall take effect on June 1, 2010.

2 Revised on December 13, 2010.

Reference 3

Evaluation Results of Shirakami-Sanchi World Heritage Property Monitoring Survey (1/3)

Monitoring objectives	Monitoring items: Major classification		Monitoring items: Minor classification		Specific survey items	Risks/precursory phenomena that could undermine the value of the natural heritage [Evaluation criteria]	Evaluation
The basic environmental conditions for meteorological, hydrological and terrestrial phenomena that sustain the beech forest are identified.	1	Meteorological conditions	(1)	Meteorological information in the World Heritage Property and surrounding area	Atmospheric temperature, precipitation amount, amount of snow, wind direction/velocity, humidity, amount of solar radiation, etc.	Meteorological conditions change to a degree that may threaten the ecosystem, etc. of Shirakami-Sanchi, due to a rise of atmospheric temperature, frequent occurrence of heavy rain and strong wind, a decrease in the amount of snow, etc. [There have been no reports of figures significantly exceeding average-year values due to abnormal weather, etc.]	・ At present, there has not been abnormal weather that may threaten the ecosystem of Shirakami-Sanchi and thus no figures that significantly exceed the average-year values have been reported. Therefore, there is no issue.
			(2)	Forest micrometeorology	Atmospheric temperature, ground temperature, forest humidity, maximum snow depth		
	2	Hydrological conditions	(1)	Water quality and flow rate of major rivers	Water quality (pH, turbidity, nutritive salts, chemical substances, etc.), flow rate	Hydrological conditions change to a degree that may threaten the river ecosystem of Shirakami-Sanchi, due to changes in water quality and flow rate.	・ At present, there have been no reports on changes in hydrological conditions that may threaten the river ecosystem of Shirakami-Sanchi due to changes in water quality and flow rate. So, there is no problem.
	3	Geological conditions, etc.	(1)	(1) Topographical features	Broad-area topographical map, and the status of changes in collapsed land	Geographical conditions, etc. change to a degree that may threaten the ecosystem of Shirakami-Sanchi, due to occurrence of land collapse/landslide, decrease in avalanche vegetation areas, changes in alpine vegetation area/wetland area, etc. [Among large-scale land collapse and landslide cases, no significant natural disturbance that may affect the ecosystem has been reported.]	・ Among large-scale land collapse and landslide cases, no significant natural disturbance that may affect the ecosystem has been reported over the past five years. So, there is no problem. ・ Identification of avalanche vegetation attributed to topographical features of Shirakami-Sanchi is insufficient because laser observation and aerial photography have not been conducted since 2011. ・ Although changes in alpine vegetation have been pointed out, they are not considered to
			(2)	Identification of ground surface coverage and unusual topographical features of entire area	Present condition of forest, shrubland grassland, collapsed land, development areas (roads, dams), etc.		

							be related to terrestrial conditions, etc.
	4	Others	(1)	Radiation level	Status of radioactive substances		・ Monitoring posts at observation sites near Shirakami-Sanchi show no particularly high values. Therefore, there is no issue regarding radiation levels.
			(2)	Agricultural chemicals	Status of use of agricultural chemicals		・ No agricultural chemicals are used in Shirakami-Sanchi. Therefore, there is no issue.
II A. Highly pristine beech forests are maintained in a healthy condition over a wide area.	1	Forest structure of beech forests, etc.	(1)	Identification of changes in forests at fixed sites	Changes in individual beech growth, hierarchical structure, understory vegetation, production amount (net production, seed production, etc.)	Significant change is observed in the status of growth of beech forest, renewal conditions of beech forest, beech distribution areas, hierarchical structure, number of beech trees growing (difference between the number of withered trees and the number of promoted trees), and production volume (net production, seed production, etc.). [No continuous and significant change has been reported with regard to growth of beech trees in the marginal part of the beech distribution area.]	・ At present, no significant changes with respect to forest structure have been observed. It is therefore considered that highly pristine beech forests are maintained. However, there are some points of concern, such as fewer good harvest years recently. Further monitoring survey should be conducted.
			(2)	Areawide changes in forests	Changes in forest physiognomy and vegetation		
			(3)	Genetic diversity and spatial genetic structure of beech populations	Genetic diversity and spatial genetic structure of beech populations		
	2	Impact on beech forests, etc.	(1)	Forest noxious insects and damage status	Damage from *Syntypistis punctatella* and *Venusia phasma*, occurrence of Japanese oak wilt, pine wilt, etc.	A substantial decrease in major trees constituting beech forests is observed due to occurrence/expansion of damage from noxious insects and meteorological damage. [There has been no significant damage from noxious insects in the surrounding area, and no damage has been discovered in areas where host tree species are densely growing.]	・ At present, no rapid negative impact of damage from noxious insects has been identified. However, damage from geometrid and other pests occurred in beech forests while oak wilt and pine wilt occurred in peripheral forest lands. Continuous attention needs to be paid.

Evaluation Results of Shirakami-Sanchi World Heritage Property Monitoring Survey (2/3)

Monitoring objectives	Monitoring items				Specific survey items	Risks/precursory phenomena that could undermine the value of the natural heritage [Evaluation criteria]	Evaluation
	Major classification		Minor classification				
II B. The diversity of flora and fauna in the beech forest is adequately preserved.	1	Flora	(1)	Flora	Present condition of vegetation, rare plants, species that grow close to their distribution limits, *Satoyama* plants, invasive plants, etc.	Significant changes are confirmed in the plant distribution area, such as disappearance of rare plants, entry and settlement of invasive species associated with utilization, as well as the regular appearance of such phenomena. [Invasive plants have not settled in the growing area of existing vegetation.]	・ Decrease in rare plants has not been reported. ・ At present, entry of invasive species has been observed along the mountain entry route. However, no significant impact on existing vegetation has been observed.
			(2)	Existing vegetation	Present condition of vegetation		
			(3)	Phenology of beech forest	Phenology of budding, fruition, coloring of leaves, fallen leaves, etc.	The phenology has significantly changed due to climate change with continuous appearance of several phenomena.	・ At present, no significant changes have been observed in phenology.
	2	Fauna	(1)	Fauna	Changes in living conditions of unique species of mammals, birds, reptiles, amphibians, insects and fish	Irrecoverable changes are observed in keystone species and umbrella species (decrease in the populations of *Ursus thibetanus* and *Capricornis crispus,* animals representing the beech forest of the relevant area, decrease in population and reproductive rate of rare birds (in particular, *Aquila chrysaetos, Dryocopus martius, Histrionicus historionicus*, among others)). [No significant change has been observed in the population of large mammals. The reproductive rate of birds of prey has not declined continuously.]	・ Although no significant change is seen in the number of large mammals, intrusion of *Cervus nippon* is a concern. ・ As for birds, the reproduction rate of *Aquila chrysaetos* has declined. However, the reproduction rate of *Aquila chrysaetos* has been declining not only in Shirakami-Sanchi. It seems to be a tendency across the entire Tohoku Region or across Japan. Since the present condition of *Dryocopus martius* has not been fully understood, further monitoring survey of the reproductive status should be conducted. ・ Distribution of *Sus scrofa* has been expanding in the Tohoku Region. Further study on their living conditions should be conducted.
			(2)	Living conditions of endangered species	Changes in living conditions of *Dryocopus martius*, *Aquila chrysaetos* and *Nisaetus nipalensis*		
			(3)	Invasive	Habitats of	Deterioration and	・ Eyewitness reports of *Cervus*

				animals	*Cervus nippon*	simplification of vegetation are observed associated with invasion of *Cervus nippon* into the Heritage Property. **[There have been no reports on living and settlement of *Cervus nippon* in municipalities around the Heritage Property.]**	*nippon* have been increasing in the municipalities around the Heritage Property. Females have also been witnessed, indicating a sign of partial settlement. Eyewitness cases have been reported within the Heritage Property but no trace of settlement has been found. However, eyewitness reports have been steadily increasing over the past several years, so attention is required. ・ Thus, since the possibility of settlement of *Cervus nippon* in the Heritage Property is rising, specific actions should be urgently taken in preparation for their settlement and reproduction.
			(4)	Impact on animals	Occurrence status of infectious diseases		・ At present, there have been no reports of impact on animals.
	3	Fungi	(1)	Survey on distribution of fungi	Condition of soil fungus, yeast, lactobacillus, actinomycete, etc.	Irreversible changes are observed in the environment, such as changes in the composition of soil fungus due to acid precipitation and changes in the composition of specific fungi due to climate change.	・ At present, there have been no reports on irreversible changes in the environment, such as changes in the composition of soil fungus due to acid precipitation and changes in composition of specific fungi due to climate change.

Evaluation Results of Shirakami-Sanchi World Heritage Property Monitoring Survey (3/3)

Monitoring objectives	Monitoring items				Specific survey items	Risks/precursory phenomena that could undermine the value of the natural heritage [Evaluation criteria]	Evaluation
	Major classification		Minor classification				
The OUV is managed properly, taking into account changes in social conditions surrounding the Property, so that the value at the time of its inscription on the World Heritage List is not adversely affected by human use or activities, and benefits regional development.	1	Usage environment	(1)	Number of visitors	Number of visitors	Significant alterations of the ecosystems by humans and decline in heritage preservation awareness are observed, such as expansion of mountain trails, contamination of river water, and frequent occurrence of various illegal acts (damaging trees, collecting plants, fishing in mountain streams, making fires). **[No malicious illegal acts or violation of manners, and no rapid increase in the number of users have been reported.]**	・ A rapid increase has not been observed in malicious illegal acts/violation of manners or the number of users. It can be assessed that no significant alterations by humans, such as expansion of mountain trails, contamination of river water, and frequent occurrence of various illegal acts, are occurring. Careful attention should be paid to fishing, which is likely to have a direct impact on fish in the streams, as well as to making fires and leaving trash along the mountain trails.
			(2)	Present status of use of major trails	Present status of use of major trails		
			(3)	User manners	Condition of guideposts, tape, paint, remaining graffiti, etc., status of environmental education and awareness raising		
	2	Contribution to regional development	(1)	Number of users of facilities at conservation and utilization sites, etc.	Number of users of facilities at conservation and utilization sites, etc.	Facilities at conservation and utilization sites are not utilized and no initiatives to raise the heritage value, such as the awareness raising activities, have been implemented. **[Decreasing trends have not been seen in the number of users of facilities at conservation and utilization sites, the number of awareness-raising activities related to heritage value, and the number of environmental education activities]**	・ The involvement of local residents is indispensable for ensuring the sustainability of the Heritage Property while keeping in mind the position of Shirakami-Sanchi for local residents. It is necessary to consider its utilization as an educational resource in connection with local human resources development in the fields of nature, history and culture.
			(2)	Environmental education and awareness raising	Status of environmental education and awareness raising using World Natural Heritage		
	3	Social environment surrounding the	(1)	Status of local areas	Total population, depopulation, population by industry	There is a risk of the disappearance of folk knowledge, such as use of mountain vegetables and hunting.	・ The currently set survey items are for general statistical data. It is difficult to judge from the figures of this data whether there is a risk of disappearance of folk knowledge, such as use of mountain vegetables and hunting.

		Heritage Property					・ Although not directly related to the value within the Heritage Property, it is desirable to provide a complementary explanation on the actual status of use by local residents in areas around the Heritage Property and its historical changes.