

# JAPAN

## INTRODUCTION

IWRB Japan Committee (Koichiro Sonobe)

**Area:** 369,698sq.km.

**Population:** 121,047,000 (1985).

Japan consists of four main islands, Hokkaido, Honshu, Shikoku and Kyushu, and a large number of smaller islands. It is situated some 200-700 km off the east coast of the Asian mainland across the Sea of Japan. The climate is generally moist and mild with four seasons, but there are marked regional variations caused by the many mountain ranges, which make up about 70% of the country. The islands are oriented in a north-south direction and form an archipelago some 3,000 km in length from 45°30'N to 20°24'N. Parts of Hokkaido and northern Honshu, particularly western regions facing the Sea of Japan, are influenced by cold winds from the continent in winter, and have some of the heaviest snowfalls in the world. By contrast, the Ryukyu, Bonin and Iwo Islands, at only 20°24'N to 30°00'N, have a warm subtropical climate. Most parts of the country except Hokkaido have a rainy season extending from June to mid-July. Heavy rainfall may also occur on the main islands during the typhoon season between August and October.

In terms of its biogeography, most of Japan lies in the Palearctic Realm, but there is a strong Indomalayan element in the extreme south, and the southern Ryukyu Islands are sometimes regarded as belonging to the Indomalayan Realm. Japan lies on a major east Asian flyway for migratory birds. Of the 556 species of birds recorded in Japan, about 10% are summer visitors which breed in Japan and winter in Southeast Asia and Australia, 22% are winter visitors which breed in China or Siberia, and 15% occur commonly on passage in spring and autumn, on their way between breeding grounds in northeast Asia and wintering areas to the south. This large proportion of migratory birds underlines the importance of international cooperation in bird conservation in the region. The conservation of wetlands is of special significance for birds in Japan, since 51% of the species, which occur there are waterfowl, as compared with only 10% of birds in general.

### Summary of Wetland Situation

Most wetlands are located in the densely populated regions of Japan, which amount to approximately 25% of the national territory. Many wetlands have disappeared as a result of human activity in the recent past. The four main types of wetlands in Japan are rivers, lakes, coastal mudflats and paddy fields. Little scientific research has been conducted on paddy fields, but they are known to provide important resting, feeding and breeding sites for many species of waterfowl. Mangrove swamps are confined to the Amami Islands and Ryukyu Islands, where they occur widely along muddy beaches and in estuaries.

### Rivers

Most rivers are relatively short and fast-flowing because of the narrow width of the country and mountainous terrain. They form alluvial fans at the foot of the mountains, and deltas at their mouths.

The number of rivers in a natural condition is continually decreasing because of the high density of human population and the high utilization of land; in the uplands, many dams have been constructed for erosion control, while in the middle and lower reaches, river banks and river beds have been affected by dredging for gravel and the straightening of water courses. The river waters are used for the generation of electricity, agriculture, industry and human consumption. In Japan today, the consumption of water per capita is one of the highest in the world. Rivers are still affected by pollution as a result of rapid urbanization and industrialization, although some improvement has been made in the levels of pollution in recent years. In spite of these environmental threats, rivers and their adjacent marshy areas continue to provide important resting, feeding and breeding habitat for a wide variety of herons, swans, geese, ducks, shorebirds, gulls and terns.

## Lakes

There are 487 natural lakes and ponds of over one hectare in extent in Japan; these comprise a total area of 2,400 [sq.km](#) and represent 0.64% of Japan's territory. The majority are situated in the northern half of the country. In addition, numerous small reservoirs have been constructed for agriculture, particularly in western Japan. In unprotected areas, some lakes have been lost to reclamation, and in many cases, eutrophication is occurring as a result of the inflow of domestic, agricultural and industrial waste. Erosion caused by deforestation, road building and other land use has greatly increased sedimentation in some lakes.

Historically, the natural lakes and ponds have supported subsistence fishing and have provided water for agriculture and fisheries, but today they also support fish and shellfish farming, sport fishing and a wide variety of other recreational activities. Several of Japan's lakes are of great limnological interest, and many provide important habitat for waterfowl, particularly herons, egrets, swans, geese, ducks, rails, shorebirds, gulls and terns.

## Coastal Mudflats

Because of its complicated topography and numerous islands, Japan has a very long coastline in relation to its size. However, of the 32,170 km of coast, only 60% or less remains in an undisturbed natural condition. The remainder has been modified in one way or another for agricultural purposes, urbanization or industrialization. This has been particularly the case with intertidal mudflats which are not only highly productive for wildlife, but are also natural water purifiers. Unfortunately, mudflats are areas where land reclamation can be carried out at low cost because of the shallow waters. The total area of mudflats in Japan, including beaches, estuaries and lagoons, is now only 53,856 ha compared with 82,621 ha in 1945. The great majority of the mudflats are on the Pacific coast; the coast of the Sea of Japan has very few tidal mudflats because of the low tidal range.

Salt marshes and other wetlands bordering the mudflats are also rapidly disappearing with reclamation. Although small in size, such wetlands may be of considerable importance as high tide roosts for waterfowl. The intertidal mudflats themselves provide the principal feeding areas for a wide variety of shorebirds, gulls and terns.

## Paddy Fields

Approximately 5,500,000 ha, or 15% of Japan's territory, are cultivated, and about half of this land is paddy fields. In recent years, the area of paddy fields temporarily out of cultivation has increased because of government action to restrict over-production of rice. Furthermore, in many areas rice fields are rapidly being lost to urbanization, as is the case with other types of wetlands.

Shallow, uncultivated rice fields provide excellent feeding habitat for herons and shorebirds before the planting season and again after the harvest. During the rice growing season in summer, Yellow

Bittern *Ixobrychus sinensis*, Ruddy Crake *Porzana fusca* and Painted Snipe *Rostratula benghalensis* feed and nest in the rice fields, and in winter, several thousand Hooded Cranes *Grus monacha* and White-naped Cranes *G. vipio* frequent the rice fields on reclaimed land at Izumi, Kagoshima Prefecture, in Kyushu.

## **Mangrove Swamps**

Mangrove swamps occur in estuaries and along adjacent coasts from the Amami Islands southwest through the Ryukyu Island chain. They are of considerable botanical interest, support a very rich invertebrate fauna, and provide important feeding and roosting habitat for many waterfowl and passerines.

## **Wetland Research**

A considerable amount of research has been carried out on wetland ecosystems and their wildlife in Japan. Unfortunately, however, the data and findings are rarely taken into account when conservation measures are being formulated. Clearly in the future, more effort must be made to use the results of this research to greatest advantage in the conservation of wetlands.

The Nature Conservation Bureau of the Environment Agency of Japan carried out an investigation of wetlands including lakes, rivers and tidal mudflats in 1973, 1978 and 1979, as part of a National Survey of the Natural Environment, and various local governments have also carried out research on the wetlands under their jurisdiction.

For many years, simultaneous waterfowl counts have been carried out at about 3,200 localities throughout Japan, and these annual censuses continue. Mid-January counts of ducks, geese and swans have been conducted by the Environment Agency since 1970. The Wild Bird Society of Japan has been organizing counts of ducks, geese and swans on 15th January since 1982, and counts of shorebirds on 29th April and 15th September since 1973. In addition, the Prefecture Government of Hokkaido has been conducting counts of Red-crowned Cranes *Grus japonensis* in eastern Hokkaido on 5th December since 1952. Waterfowl counted during the nationwide censuses in 1986 included 22,600 swans, 21,300 geese and 1,278,300 ducks in mid-January, 100,000 shorebirds in spring, and 50,000 shorebirds in autumn. In December 1985, 384 cranes were located during the census in eastern Hokkaido. Of the ducks, the most abundant species were *Anas platyrhynchos* and *Aythya marila* (over 200,000 of each), followed by *Anas penelope*, *A. acuta*, *A. crecca* and *A. poecilorhyncha* (100,000-200,000). It is probable that many more waterfowl go uncounted; this is particularly the case with shorebirds, since the peak period for migration differs from species to species.

The Yamashina Institute for Ornithology is commissioned by the Environment Agency to carry out bird banding; during the year from April 1985 to March 1986, 100,600 birds were banded, including many herons, shorebirds, swans, ducks and cranes. The Wild Bird Society of Japan, in conjunction with the Yamashina Institute, has presented colored bird-bands to relevant organizations in the People's Republic of China and the USSR, for an investigation of the movement of Hooded and White-naped Cranes between their breeding grounds on the continent and their wintering area at Izumi. The Yamashina Institute and Wild Bird Society of Japan organized research workshops in the Philippines in 1984 and in Taiwan in 1987, in an effort to extend the bird banding network in East Asia. Also in 1987, the Wild Bird Society of Japan attended the Japan-Democratic People's Republic of Korea Migratory Birds Conservation Symposium, during which both countries agreed to participate in a colour-banding project on the Chinese Egrets (*Egretta eulophotes*) breeding in North Korea. Numerous studies have been conducted on the Red-crowned Cranes (*Grus japonensis*) in Hokkaido, including aerial surveys of the breeding grounds in 1984, 1985 and 1986 by the International Crane Foundation Japan, Wild Bird Society of Japan and Environment Agency.

## **Wetland Area Legislation**

Japan's system of protected areas was initiated in 1934 following the establishment of the National Park Commission (1930) within the Ministry of the Interior. The first national park was designated under the "National Park Law" (No. 36 of 1931) in 1934. In 1950 a new category of protected area, the Quasi-National Park, was introduced and on 1st June 1957, a "Natural Parks Law" (No. 161) was enacted which established a system of National Parks, Quasi-National Parks and Prefecture Natural Parks. Other types of protected area are covered by the Nature Conservation Law, enacted in 1972. National Parks are designated by the Director General of the Environment Agency with advice from the Council on Nature Conservation, while Quasi-National Parks are first recommended by the Prefecture before consideration by the Director General. Special Protection Areas and Special Areas can be established under conservation legislation at both regional and national level. Such legislation includes the Law concerning Wildlife Protection and Hunting (1918 and amended in 1978) and the Law for the Protection of Cultural Properties (1977).

Protected areas in wetlands are thus covered by several different laws depending on their designation:

1. Special Wildlife Protection Areas are governed by the Law concerning Wildlife Protection and Hunting.
2. Special Nature Conservation Areas and Wilderness Areas are governed by the Nature Conservation Law.
3. Special Areas of National Parks, Quasi-National Parks and Prefecture Parks are governed by the Natural Parks Law.
4. Natural Monuments are governed by the Law for the Protection of Cultural Properties.

Water quality is controlled by the Water Pollution Control Law and marine pollution by the Marine Pollution Prevention Law. The Law concerning Special Measures for Conservation of Lake Water Quality was enacted in 1984 to control water quality in lakes and ponds.

The conservation of migratory birds including wetland species is taken into account in the Migratory Bird Treaties between Japan and the U.S.A. (1974), Japan and Australia (1981) and Japan and China (1981). These treaties deal not only with the protection of migratory birds but also with the protection of their habitat.

The Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) was ratified by the Japanese Government on 17th June 1980. This followed on from the establishment of the IWRB Japan Committee in 1977 and the IWRB Meeting in Sapporo in 1980, which promoted the signing of the Convention by Japan. The first wetland to be designated under the Convention was the Kushiro Marsh in Hokkaido, but on 27th May 1985 a second site which includes Izumuma and Uchinuma Lakes in Miyagi Prefecture was listed. It is hoped that further sites will be listed under the Ramsar Convention in the future.

Kushiro Marsh, the most extensive marsh in Japan and an extremely important breeding area for *Grus japonensis*, *Gallinago hardwickii* and many other waterfowl, has recently been designated as the country's twenty-eighth National Park.

## **Wetland Area Administration**

The governmental body which designates a wetland conservation area under one of the four major environmental laws is responsible for the administration of the designated area. The Law concerning Wildlife Protection and Hunting, the Nature Conservation Law, the Natural Parks Law and the laws concerning freshwater pollution are administered by the Environment Agency. The Law for the

Protection of Cultural Properties is administered by the Agency for Cultural Affairs in the Ministry of Education. National Parks are administered by the Environment Agency, and Quasi-National Parks are administered by the Prefecture Governments.

Although the wintering area for over 7,000 cranes at Izumi has been designated as a Special Natural Monument, most of it is privately owned. The Agency for Cultural Affairs therefore rents 51 ha of paddy fields from the landowner in winter to provide undisturbed roosting, resting and feeding sites for the birds.

The system of bird sanctuaries (observatories) for waterfowl began in Japan with the establishment of the Aichi Prefectural Yatomi Bird Park in 1973. This was followed by the Chiba Prefectural Gyotoku Bird Observatory in 1976, the Tokyo Metropolitan Oi Bird Park in 1978, and the Osaka City Nanko Bird Park in 1983. The Wild Bird Society of Japan established its first sanctuary at Lake Utonai in western Hokkaido in 1981. This sanctuary, which includes the lake and surrounding marshes (511 ha), was made possible by donations to the Wild Bird Society totaling 100 million Yen. The Society has a member of staff permanently stationed at the sanctuary, with responsibility for developing the conservation plan, managing the area, investigating the wildlife and conducting a nature education programme for visitors. Elsewhere, an observation centre was constructed at Katanokamoike Pond in Kaga City in 1985, and facilities for observing waterfowl have been provided at several wetlands under the aegis of the sanctuary system by prefecture and city authorities.

## **Organizations involved with Wetlands**

### **a) Governmental Organizations**

#### **- Environment Agency**

Responsible for wildlife protection, management of wetlands designated under the Ramsar Convention, and designation and management of National Parks, Nature Conservation Areas and Wildlife Protection Areas. The Nature Conservation Bureau conducts nationwide surveys of natural ecosystems and wildlife at regular intervals, and undertakes a variety of studies and surveys relevant to wetland conservation.

#### **- Agency of Cultural Affairs**

Responsible for the protection of national monuments and cultural properties.

#### **- National Land Agency**

Responsible for land-use planning.

#### **- Ministry of Construction**

Responsible for the management of rivers.

#### **- Ministry of Transport**

Responsible for reclamation of the foreshore.

### **b) Non-Governmental Organizations**

There are many non-governmental organizations concerned with environmental matters and nature conservation in Japan, particularly at the local level, but most are rather small. Many are primarily concerned with birds, notably cranes, ducks, geese and swans, and as such have a considerable interest in wetlands. Some of the major national organizations are as follows:

#### **- Nature Conservation Society of Japan**

#### **- Wild Bird Society of Japan**

#### **- Yamashina Institute for Ornithology**

#### **- Japanese Association for Preservation of Birds**

- Japan Swan Society
- IWRB Japan Committee
- ICBP Japanese Section
- WWF Japan

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The IWRB Japan Committee has compiled this Japanese Wetlands Inventory in the hope that it will promote the preservation of wetlands and waterfowl, and encourage greater international cooperation in the conservation of migratory birds and their habitats, especially in Asia and the Pacific. Mr Koichiro Sonobe, Secretary General of IWRB Japan Committee, has acted as the National Coordinator.

Dr Shigeru Matsui, President of the Committee, wishes to acknowledge the assistance of the Nature Conservation Bureau of the Environment Agency in providing factual information on the natural condition and legal status of the wetlands, from the results of its National Survey on the Natural Environment. Dr Matsui also wishes to thank the Wild Bird Society of Japan for making available the results of its nationwide simultaneous counts of Anatidae and shorebirds. Thanks must also go to Mr Takeshi Maru for collecting and compiling material and data for the inventory, to Mr Yasuo Tomoda, Dr Manabu Abe and Mr Shinichi Hanawa for assistance in the compilation of this inventory, and to Dr Lowell Adams, Ms Aya Otsuka, Mr Naoya Mitake, Mr Kazuyoshi Uematsu, Ms Masako Kume and Ms Noriko Izawa for proof-reading and typing the manuscript.

## WETLANDS

The site descriptions are divided into two sections: wetlands of international importance for waterfowl (sites 1 to 73), and other important wetlands (sites 74 to 86).

### Wetlands of International Importance for Waterfowl

The site descriptions are taken from a report prepared for this Directory by the IWRB Japan Committee. The Committee has selected 73 sites for inclusion in the Directory on the basis of the following criteria: (a) wetland habitats supporting large populations of water birds; (b) wetland habitats supporting significant numbers of rare species of water birds; and (c) characteristic habitats with a special value for water birds in Japan. Twenty-four of the most important wetlands, classified as "extremely important sites", are given full treatment in the site accounts (sites 1-24). The other 49 wetlands, classified as "very important sites", are given an abbreviated treatment (sites 25-73). The report of the IWRB Japan Committee is being published in full in Japanese. The number of sites and format will be similar to the English version, but the report will include more detailed information on the sites, as well as site illustrations.

**Wetland name:** Sarobetsu

**Country:** Japan

**Coordinates:** 45°05'N, 141°41'E;

**Location:** Toyotomi-Cho, Horonobe-Cho, Teshio-Gun, 30km south of Wakkana, near the northern tip of Hokkaido.

**Area:** 20,000 ha.

**Altitude:** 1-8m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 11, 14, 15 & 22.

**Description of site:** A complex of 13 small, fresh to slightly brackish lakes including Kabutonuma (145 ha), Penkenuma (186 ha) and Pankenuma (348 ha), extensive marshes and peat bogs behind a belt of coastal dunes with numerous ponds and covered in coniferous forest. The wetlands were formed by coastal regression, and are fed by several slow-flowing rivers and streams, local run-off and snow melt. The average depth of the lakes is 0.8-1.5m, and the maximum 1.3-5.0m. The pH values at Penkenuma and Pankenuma range from 6.2 to 6.9. The lakes and marshes are frozen over from December to April. There is an island of higher ground (8.5-13.4 m.a.s.l.) in the centre of the wetland.

**Climatic conditions:** Cold temperate climate with an average annual rainfall of 1,241 mm, and a mean annual temperature of 5.6°C (mean January temperature 1.1°C).

**Principal vegetation:** The lake and pond vegetation is dominated by *Nuphar japonicum*, *Trapa natans* and *Potamogeton distinctus*; the marsh vegetation by *Phragmites communis*, *Juncus setchuensis*, *Scirpus lacustris*, *Typha latifolia*, *Eriophorum vaginatum*, *Drosera anglica* and *Sphagnum palustre*. There are coniferous forests on the adjacent coastal sand dunes.

**Land tenure:** Partly state owned and partly private.

**Conservation measures taken:** Included within a National Park.

**Conservation measures proposed:** There is a proposal to create a National Wildlife Protection Area for migratory birds.

**Land use:** Commercial fishing; agriculture and some residential use in surrounding areas.

**Disturbances and threats:** None at present, but there is a plan to construct a treatment plant for high-level radioactive waste in the surrounding area.

**Economic and social values:** No information.

**Fauna:** An extremely important staging area for migratory waterfowl of a wide variety of species; also a breeding area for large numbers of *Anas falcata*, *A. platyrhynchos*, *Aythya fuligula* and *Mergus albellus*, and small numbers of *Podiceps grisegena*. The marshes also provide breeding habitat for many passerines including *Motacilla flava*, *Saxicola torquata*, *Locustella lanceolata*, *Emberiza aureola* and *E. schoeniclus*. Rough-legged Buzzards, Gyr Falcons and Snowy Owls (*Buteo lagopus*, *Falco rusticolus* and *Nyctea scandiaca*) are regularly recorded as winter visitors.

The fish fauna includes *Carassius* sp., *Misgurnus anguillicaudatus*, *Cyprinus carpio*, *Hypomesus solidus*, *Chaenogobius urotaenia*, *Salanx microdon* and *Gasterosteus aculeatus*. Reptiles include *Elaphe climacophora*, *F. quadrivirgata*, *Takydromus lachydromioides*, and amphibians include *Hyla japonica*, *Rana chensinensis* and *Hynobius retardatus*. Twenty-three species of mammals have been recorded including the Brown Bear *Ursus arctos*. The invertebrate fauna includes the shellfish *Anodonta woodiana*, *Corbicula sandai*, *Radix japonica* and *Cristaria plicata spatiosa*.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out.

**References:** Environment Agency (1972-1984); Hokkaido (1981); Hokkaido Development Bureau (1972); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2b, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Kuccharo

**Country:** Japan

**Coordinates:** 45°10'N, 142°20'E;

**Location:** Hamatonbetsu-Cho, 50 km southeast of Wakkanai, near the northern tip of Hokkaido.

**Area:** 2,177 ha (lake 1,402 ha; marshes 775 ha).

**Altitude:** Sea level.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 11 & 14.

**Description of site:** A slightly brackish lake of 1,402 ha and some 775 ha of surrounding fresh to brackish marshes on the coastal plain of northern Hokkaido. The lake is divided into two parts, the southernmost and slightly smaller part being connected to the sea by a channel. The average depth of the lake is 1m, and the maximum 2.5m. In recent years, the depth of the lake has been decreasing as a result of an increased silt load in the rivers feeding the lake. Salinities range from 0.23 to 2.71 p.p.t., and pH values from 4.9 to 6.5. The lake and marshes are frozen over from late December to early March.

**Climatic conditions:** Cold temperate climate with an average annual precipitation of 1,200 mm and a mean annual temperature in the range 4.9-6.5°C; the annual snowfall is 1-1.5m.

**Principal vegetation:** The dominant vegetation in the lake is *Potamogeton crispus*; the principal marsh vegetation is *Phragmites communis*, *Typha latifolia*, *Scirpus lacustris* and *Juncus setchuensis*, with stands of *Alnus japonica*. There are patches of forest in surrounding areas.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** The wetland is protected in a National Wildlife Protection Area of 2,803 ha, established in March 1983 and in effect until March 2003. The reserve includes a Special Protection Area of 1,607 ha, in effect for the same period of time. This Special Protection Area is also an Hokkaido Prefecture Park.

**Land use:** Commercial fishing, sport fishing, pleasure boating and other outdoor recreation. Agriculture and residential areas in surrounding areas.

**Disturbances and threats:** Water pollution.

**Economic and social values:** The lake supports a small commercial fishery, and is popular for outdoor recreation.

**Fauna:** Situated near the northernmost tip of Hokkaido, Lake Kuccharo constitutes an extremely important staging area for migratory swans, ducks and other waterfowl crossing La Perouse Strait to and from Sakhalin. The lake is particularly important for swans which visit the area from September to November on their way south, and again in March and April on their way north. Approximately 3,000 *Cygnus columbianus* and *C. cygnus* occur, the former making up about 70-80% of the total. Some 30,000 or more ducks visit the lake in mid-October, but most stay only a short time. *Anas penelope* is the most numerous species. Other migrants and winter visitors include *Haliaeetus pelagicus* and *Falco peregrinus*. Breeding species include *Ardea cinerea*, *Pandion haliaetus*, *Haliaeetus albicilla* and a wide variety of passerines such as *Erithacus calliope*, *Acrocephalus bistrigiceps*, *Locustella ochotensis* and *Emberiza spodocephala*. The fish fauna includes *Hypomesus olidus*, *Platichthys stellatus*, *Cyprinus carpio*, *Tribolodon hakonensis*, *Ammodytes personatus*, *Eleginus gracilis* and *Gasterosteus aculeatus*. Shellfish include *Cipangopaludina japonica*, *Anodonta woodiana*, *Corbicula japonica* and *Mya japonica*.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out, and a Bird Banding Station has been established by the Environment Agency.

**References:** Environment Agency (1972-1984); Hokkaido (1980a); Karpowicz (1985); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1 b, 2c, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Furen

**Country:** Japan

**Coordinates:** 43°18'N, 145°14'E;

**Location:** Nemuro-Shi and Bekkai-Cho, Notsuke-Gun, 20 km west of Nemuro, eastern Hokkaido.

**Area:** 7,869 ha (lake 5,219 ha, estuarine marshes 2,650 ha).

**Altitude:** 0-1m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 02, 06, 08, 11 & 22.

**Description of site:** A large, brackish, tidal lagoon (Lake Furen) with a broad connection to the sea, and extensive fresh to brackish marshes and peat bogs along the rivers and streams entering the lake, particularly along the Furen River. The maximum depth of the lagoon is 11m, and there is a tidal variation of about 1m. Extensive mudflats with shallow pools are exposed at low tide. Inland from the lagoon, the marshes give way to a wet grassland and shrub community. Most of the lake and the marshes are frozen over from late December to late March.

**Climatic conditions:** Cold temperate climate with an average annual rainfall of 1,077.3 mm, a mean annual temperature of 5.7°C, an average of 112.6 foggy days per year, and an average of only one hour of sunshine a day.

**Principal vegetation:** Brackish marshes dominated by *Scirpus lacustris*, and reed-beds of *Phragmites communis*; a mixed grass/shrub community inland from the marshes.

**Land tenure:** Most of the area is state owned; the rest is partly owned by Nemuro City and partly under private ownership.

**Conservation measures taken:** The wetland is within a Prefecture Wildlife Protection Area of 6,462 ha. A Special Protection Area of 937 ha was established within this reserve in July 1973 and is in effect until July 1993. A Prefecture Park has also been established.

**Conservation measures proposed:** The Nemuro Local Government is proposing to establish a National Wildlife Protection Area and to create a bird park in the Shunkunitai primeval area.

**Land use:** Commercial and sport fishing. Agriculture and livestock rearing in surrounding areas.

**Disturbances and threats:** Some marshes are being converted to meadows under a new dairy project, while others are being drained for agricultural land. Deforestation of the upper reaches of the rivers flowing into the wetland has resulted in accelerated spring run-off, serious soil erosion in the hills, increased siltation in the wetlands, excessive flooding in the marshes in spring and drought in summer. The problem is particularly severe in the Shunkunitai area where land subsidence is occurring.

**Economic and social values:** The lake supports a small commercial fishery and provides many opportunities for outdoor recreation.

**Fauna:** An extremely important breeding and staging area for a wide variety of waterfowl and other birds associated with wetlands. Of the 240 species recorded in the area, 119 are waterbirds. Breeding species include *Grus japonensis* (21 pairs in 1985, over a quarter of the Japanese breeding pairs), and large numbers of *Tringa totanus*. Very large numbers of swans, geese, ducks and shorebirds occur during the migration seasons, particularly in autumn (August to October). Peak counts have included:

890 *Anser fabali*

8,000 *Cygnus cygnus* (in December)

790 *Branta hutchinsii*

5,170 *Anas penelope*

2,930 *Aythya americana*

*Anas crecca*, *A. acuta* and *Aythya fuligula* also occur in very large numbers. Fifty-one species of shorebirds have been recorded, peak counts including 425 *Charadrius mongolus*, 3,260 *Tringa brevipes* and 900 *Calidris ruficollis*. In view of the constant movement of birds through the area, it is clear that the total number of birds using the site is far in excess of the peak counts. The endangered Swinhoe's Egret *Egretta eulophotes* has occurred at the lake, and the rare Blakiston's Fish-Owl *Ketupa blakistoni* breeds in the surrounding forests. Other unusual species in the marshes include the buntings *Emberiza pallasi* and *Plectrophenax nivalis*.

Fishes include *Oncorhynchus keta*, *O. mason* and *Clupea pallasi*, and shellfish include *Corbicula sandal*.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out, the breeding cranes and migrant swans have been studied in some detail, and a Bird Banding Station has been established by the Environment Agency.

**References:** Archibald (1987); Environment Agency (1972-1984); Hokkaido (1980b); Karpowicz (1985); Special Committee for Crane Conservation (1986); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2a, 2b, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Kushiro Marsh

**Country:** Japan

**Coordinates:** 43°03'N, 144°24'E;

**Location:** north of Kushiro City, eastern Hokkaido.

**Area:** 29,084 ha (including a Ramsar Site of 5,012 ha and 22,678 ha of moorland).

**Altitude:** 1.5-5m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 11, 13, 15 & 22.

**Description of site:** An extensive marshy floodplain with several small freshwater lakes, formed during a period of coastal regression and separated from the sea by a belt of coastal dunes some 13-1.6 km wide. The wetland has developed along the Kushiro River, which runs through the middle of the marshes, and along the Akan River in the west; it is surrounded by high ground on three sides, but open to the south. The Kushiro River is a slow meandering stream flowing for a distance of 67

km through the marshes, and with many oxbow lakes and ponds, particularly along its lower reaches. The principal lakes are Shirarutoronuma (337 ha), Toroko (620 ha) and Takkobunuma (137 ha). There are extensive reed-beds, sedge marshes and peat bogs throughout the floodplain, and the whole area is underlain by peat soils of predominantly low quality. The marshes are fed by the Kushiro and Akan Rivers, local run-off, snow melt and a number of springs, water levels rising somewhat with the spring thaw. Some of the springs are warm and maintain small areas of open water throughout the winter. The average depth of the lakes is 2m, and pH values are in the range 6.9-7.6.

**Climatic conditions:** Cold temperate climate with an average annual rainfall of 1,124 mm and a mean annual temperature of 5.9°C. The weather in spring and summer is often cold and humid owing to the influence of sea fogs, but autumn and winter tend to be fine and dry. Snow is frequent in winter, with a maximum of 1.23m falling at one time, and the temperature often falls below -20°C.

**Principal vegetation:** The marsh vegetation is dominated by reed-beds of *Phragmites communis* with extensive areas of sedges *Carex augustinowiczii*, *C. caespitosa* and *C. schmidtii*. Other common species include *Calamagrostis langsdorffii*, *Alnus japonica* and *Sanguisorba tenuifolia* var. *alba*.

**Land tenure:** At least 48.3% of the area is state owned and 37.6% privately owned. Ownership of the Ramsar Site is mainly state (4,878 ha) with some private (134ha).

**Conservation measures taken:** 5,012 ha were listed under the Ramsar Convention at the time of accession on 17 June 1980. This area is located at the centre of the marsh where all the rivers converge, and includes about 17% of the total marsh habitat. It was first designated as a Special Protection Area in 1935 under the Law concerning Wildlife Protection and Hunting. The Ramsar Site is now a National Wildlife Protection Area, administered by the Environment Agency. 3,833 ha of this reserve were designated as a Special Protection Area from March 1979 to October 1998.

The Wildlife Protection Area is also protected as a Special Natural Monument under the law for the Protection of Cultural Properties. Land reclamation, tree and bamboo felling and building of structures are strictly controlled, and hunting and fishing are prohibited. Under the management plan, trained managers are stationed at the site throughout the year, and are based at the specially constructed management office and observation tower. Officials in charge of wildlife protection undergo an annual training session at the Training Institute for Environmental Pollution Control (Environment Agency). Several artificial feeding stations have been established for the wintering cranes (*Grus japonensis*) in the surrounding area, and large quantities of food have been provided every year since 1952. The Wild Bird Society of Japan has established a sanctuary to protect a wintering area of the cranes at Tsurui Village on the northern edge of Kushiro Marsh, and the marsh itself has recently been protected in the Kushiro-Shitugen National Park, established by the Environment Agency.

**Conservation measures proposed:** There is a proposal to create a National Park at the wetland.

**Land use:** None at the wetland; land in adjacent areas is used for agriculture, forestry, livestock raising and residential purposes.

**Possible changes in land use:** Straightening of rivers and conversion of marshes to agricultural land.

**Disturbances and threats:** Much of the wetland remains in a relatively undisturbed state. However, the clearing of forests for agriculture and the straightening and deepening of rivers in the catchments area are having a detrimental effect on the wetlands downstream. Spring run-off has been accelerated, resulting in increased soil erosion in the hills, increased siltation in the marshes, excessive flooding in spring and drought in summer. Reafforestation programmes to prevent further soil erosion have not followed quickly enough to protect the marshes, and some 1,568 ha of marshes have been destroyed since 1972 along the Ninishibetsu River alone. Increased road building and urban sprawl around Kushiro have also resulted in the loss of wetland habitat. The high density of power lines in the Kushiro area continues to cause mortality to cranes, even though markers have been attached to the power lines to render them more readily visible.

**Economic and social values:** The crane feeding stations attract large numbers of visitors to the area every year.

**Fauna:** Kushiro Marsh is one of the largest and most important natural wetlands remaining in Japan. The shallow marshes are particularly important as a breeding and wintering area for the Red-crowned (Japanese) Crane *Grus japonensis*. The entire Japanese population breeds in eastern Hokkaido and the great majority of the birds winter in the Kushiro area. In 1985, 384 cranes were located during the annual mid-winter census, mainly concentrated around the artificial feeding stations. Many of the cranes leave the area in spring and migrate to breeding grounds in Nemuro District and elsewhere in eastern Hokkaido, but the remainder disperse to breeding territories throughout the Kushiro Marshes. Thirty-seven breeding territories were located in the 1970s, and about 21 pairs have bred in recent years (over a quarter of the Japanese breeding pairs). Other breeding birds include *Podiceps grisegena*, *Botaurus stellaris*, *Ixobrychus sinensis*, *I. eurhythmus*, *Ardea cinerea* and *Gallinago hardwickii*. Large numbers of swans, geese, ducks and shorebirds occur during the migration seasons, and some swans and ducks remain throughout the winter. One recent mid-winter count recorded eleven species of Anatidae including 1,070 *Cygnus cygnus*, 740 *Aythya fuligula* and small numbers of *Aiws platyrhynchos*, *Bucephala clangula* and *Mergus merganser*. Many species of raptors have been recorded; *Haliaeetus albicilla*, *Buteo buteo*, *Circus aeruginosus*, *Accipiter gentilis* and *Falco subbuteo* breed, and *Haliaeetus pelagicus*, *Buteo lagopus* and *Circus cyaneus* occur in winter. In all, over 150 species of birds have been recorded at the wetland. Twenty-six species of mammals have been recorded, including *Vulpes vulpus*, *Nyctereutes procyonoides*, *Mustela nivalis* and *Tamias sibiricus*. Amphibians include *Salamandrella keyserlingii*, *Hynobius retardatus*, *Rana chensinensis* and *Hyla (arborea) japonica*; and reptiles include *Takydromus tachydromoides*, *Eumeces laticutatus*, *Elaphe quadrivirgata*, *E. conspicillata* and *E. climacophora*. Thirty-two species of fishes have been recorded, including *Cyprinus carpio*, *Carassius carass*, *Hucho perryi*, *Tribolodon hakonensis*, *Pungitius tymensis* and *Lampetra reissneri*. Shellfish include *Anondonta woodiana*, *Cristaria plicata* *apatiosa* and *Unio margaritifera*, and at least 46 species of dragonfly (Odonata) and 84 species of butterfly (Lepidoptera) are known to occur.

**Special floral values:** No information.

**Research and facilities:** A detailed survey of the wetland was carried out in 1978 as part of a national wildlife survey; an annual census of the cranes has been made each winter since 1952 by the Hokkaido Educational committee and there is an annual mid-winter census of the Anatidae conducted with the help of volunteers. Crane habitat has been studied by the Environment Agency in order to assess how best to conserve the site and promote the effective conservation of the cranes, and several studies have been carried out on the breeding status and ecology of the cranes e.g. by Archibald (1987) and Masatomi (1980a & 1980b).

**References:** Anon (1982); Archibald (1987); Environment Agency (1972-1984); Hokkaido Board of Education (1981); IUCN Conservation Monitoring Centre (1987); Karpowicz (1985); Kushiro City Museum (1975); Masatomi (1981a & 1981b); Masatomi, Momose *et al.* (1986); Miura (1981); Special Committee for Crane Conservation (1986); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** lb. 2a, 2b, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Utonai

**Country:** Japan

**Coordinates:** 42°42'N, 141°43'E;

**Location:** 10 km northeast of Tomakomai City, Hokkaido.

**Area:** 510 ha.

**Altitude:** 1-5m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 12, 14 & 15.

**Description of site:** A shallow freshwater lake of 243 ha surrounded by marshes with some small patches of forest, an extensive freshwater marsh with several ponds to the east of the lake, and

marshes along the associated rivers and streams extending to the base of the nearby hills. The average depth of the lake is 1m, the maximum depth 1.5m, and the pH value 6.8-7.5. Extensive mudflats are exposed at low water levels, and the lake and marshes are frozen over from December to March. Climatic conditions: Cold temperate climate with an average annual rainfall of 1,269 mm, and a mean annual temperature of 7.3°C.

**Principal vegetation:** The lake vegetation is dominated by *Vallisneria asiatica*, *Trapa natans*, *Nuphar japonicum*, *Zizania latifolia*, *Scirpus lacustris* and *Hippuris vulgaris*; the dominant marsh vegetation is *Carex brownii*, *Phragmites cotnmunis*, *Miscanthus arenicola* and *Miscanthus sp.*

**Land tenure:** Principally state and Tomakomai City.

**Conservation measures taken:** The wetland is protected in a National Special Wildlife Protection Area of 510 ha, established in March 1982 and in effect until October 1991. The Wild Bird Society of Japan has established and manages a bird sanctuary, the Utonaiko Sanctuary (established in May 1981).

**Land use:** Outdoor recreation; there is a youth hostel and tourist hotel by the lake, and facilities for pleasure boating. There are plantations of conifers in surrounding areas.

**Disturbances and threats:** A flood control project on the Chitose River (involving the construction of a canal) and the designation of an area to the north of the lake for the development of light industry could pose serious threats to the wetland in the future.

**Economic and social values:** The lake is of considerable value for outdoor recreation.

**Fauna:** An extremely important breeding and staging area for a wide variety of waterfowl. Large numbers of swans, geese and ducks stop over at the wetland in October and November, and again in late March and early April. Peak migration counts have included about 2,000 *Anser albifrons*, *A. fabalis*, and 1,000 *cygnus cygnus*, *C. columbianus*. Some 300-400 *C. cygnus* and a small number of ducks and *Ardea cinerea* remain throughout the winter, this being the northernmost wintering site for the latter in Japan. Twenty-seven species of shorebirds have been recorded on migration; over 900 shorebirds including 120 *Tringa erythropus* have been recorded at the peak of the autumn migration. Breeding birds include *Anas falcata*, *A. platyrhynchos*, *A. poecilorhyncha*, *Mergus merganser* (probable), *Circus aeruginosus*, *Gallinago hardwickii*, *Acrocephalus bistrigiceps*, *Emberiza aureola* and *Emberiza spodocephala*. A wide variety of raptors have been observed including *Haliaeetus albicilla*, *H. pelagicus*, *Circus cyaneus*, *Falco peregrinus* and *F. subbuteo*.

Other fauna includes the fishes *Cyprinus carpio*, *Tribolodon hakonensis*, *Anguilla japonica* and *Carassius sp.*, the shellfish *Unio margaritifera* and *Cristaria plicata spatiosa*, and a variety of shrimps.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out. Observation facilities have been provided by the Wild Bird Society of Japan, and there are several professional managers in residence at the Sanctuary.

**References:** Environment Agency (1972-1984); Hokkaido (1980c); Karpowicz (1985); Tazawa & Anzai (1982); Wild Bird Society of Japan (1982-85, 1982-86, 1984 & 1985).

**Criteria for inclusion:** lb. 2c, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** The Rokkasho Lakes

**Country:** Japan

**Coordinates:** 40°43'-40°57'N, 141°20'E;

**Location:** near Rokkasho Village, 25-50 km NNW of Hachinohe, Aomori Prefecture, Honshu.

**Area:** 8,053 ha (total area of eight lakes).

**Altitude:** 0-6m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 08, 11, 14, 19 & 20.

**Description of site:** A group of eight lakes and their associated marshes, including four natural freshwater lakes (Ichiyaginuma, Tamoginuma, Uchinuma and Anenuma), two brackish lakes (Obuchinuma and Ogawara), a freshwater lake formed by the damming of a tidal basin (Takahokonuma), and an area of freshwater marshes and wet farmland which is all that remains of Lake Hotokenuma since it was reclaimed for agriculture. The lakes extend for 30 km in a north-south chain parallel to the coast. The four northernmost lakes were formed by natural dams, the others from coastal lagoons. There are rice paddies along the rivers entering the lakes, and in many places the paddies extend to the lake shores. The average depth of some of the lake is as follows: Ogawara 10.5m (maximum 24m), Anenuma 1.3m and Tamoginuma 3.3m. The lakes are frozen over in January and February.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,520 mm, and a mean annual temperature of 9.4°C.

**Principal vegetation:** The dominant lake vegetation is *Zizania latifolia*; the marsh communities are dominated by *Phragmites communis*, *Typha latifolia*, *Scirpus lacustris* and *S. fluviatilis*. The surrounding hills are covered with mixed deciduous forest.

**Land tenure:** State, private, semi-public corporations, etc.

**Conservation measures taken:** Shooting has been prohibited in the Obuchinuma Lake area until October 1988.

**Conservation measures proposed:** The Aomori-ken Chapter of the Wild Bird Society of Japan is currently campaigning for the purchase of land at the breeding site of *Megalurus pryeri*.

**Land use:** Sport fishing, recreational boating and a bathing resort at Lake Ogawara; commercial fishing and fish culture at other lakes. Agriculture and residential areas in surrounding areas.

**Possible changes in land use:** A large-scale Development Plan has been prepared for the region

**Disturbances and threats:** Salinities are decreasing as the flow of sea water into the lakes is being reduced by dams.

**Economic and social values:** The lakes support an important fishery, and provide many opportunities for outdoor recreation.

**Fauna:** The lakes and marshes constitute an extremely important staging and wintering areas for migratory waterfowl. Waterfowl recorded at Lake Ogawara and Lake Obuchinuma during the annual mid-winter counts of 1985 included:

600 *Cygnus cygnus*

182 *Anas penelope*

91 *Anas platyrhynchos*

38 *Anas poecilorhyncha*

and 213 unidentified swans and other waterfowl. Many more waterfowl stop over at the lakes during the migration seasons. Forty species of shorebirds have been recorded including the rare *Limnodromus semipalmatus*, and counts of 500-1,000 *Charadrius alexandrinus*, *C. mongolus* and *Arenaria interpres* have been obtained at the peak of the migration season. Breeding birds include *Ixobrychus eurhythmus*, *Megalurus pryeri* and *Emberiza yessoensis*. Many species of raptors are regularly observed in the area, including *Haliaeetus albicilla* and *Falco peregrinus*.

The lakes have a rich fish fauna, including *Hypomesus olidus*, *Tribolodon hakonensis*, *Carassius sp.*, *Platichthys stellatus*, *Tridentiger obscurus*, *Chaenogobius urotaenia urotaenia*, *C. annularis*, *Acanthogobus flavimanus*, *Hypophthalmichthys moritrix*, *Ctenopharyngodon idella*, *Salanx microdon*, *Mugil cephalus*, *Plecoglossus altivelis*, *Pungitius sinensis*, *Misgurnus anguillicaudatus*, *Paralichthys olivaceus* and *Hypomesus japonicus*. Thirty-eight species of fishes have been recorded in Lake Ogawarako alone. The rich invertebrate fauna includes the shellfish *Corbicula japonica*, *C. leana* and *Cristaria plicata spatiosa*, and a wide variety of crabs, shrimps and aquatic insects.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out.

**References:** Environment Agency (1972-1984); Aomori Board of Education (1971); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2a, 2b, 2c, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Izunuma and Uchinum Lakes

**Country:** Japan

**Coordinates:** 38° 43'N, 141°07'E;

**Location:** Wakayanagi and Tsukidate, Hasama-Cho, Miyagi Prefecture, 50 km NNE of Sendai, Honshu.

**Area:** Ramsar Site 559 ha (Lake Izunuma 289 ha, Lake Uchinuma 98 ha).

**Altitude:** Izunuma 7m, Uchinuma 12m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 11, 13, 14 & 19.

**Description of site:** Two shallow lakes with surrounding marshes; Izunuma (289 ha), a slightly brackish lake with a maximum depth of 1.3m., and Uchinuma (98 ha) to the south, a freshwater lake with a maximum depth of 1 m. The two lakes are connected at their western ends by a channel half a kilometer in length. They were formed through the alluvial banking process of the Hasama River, but frequent land reclamation works carried out at the wetland since the late 19th century have contributed to the present shape of the lakes. There are extensive marshes around the lakes and adjacent rice paddies which extend to the base of the nearby hills. The area of rice paddies has recently decreased as land has been taken for road construction and housing developments. Lake Izunuma is fed by five rivers and streams, Uchinuma by three. The water level in the lakes varies according to requirements for irrigation, and the lakes freeze over in February.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,052 mm, a mean February temperature of -0.3°C, and a mean July temperature of 24.6°C.

**Principal vegetation:** The dominant lake vegetation includes *Hydrilla verticillata*, *Utricularia japonica*, *Trapella sinensis*, *Nymphaea tetragona*, *Potamogeton distinctus*, *Trapa natans* var. *quadrispinosa*, *T. incisa*, *Nelumbo nucifera* and *Myriophyllum verticillatum*; the marsh communities are dominated by *Phragmites communis*, *Zizania latifolia* and *Scirpus wichurai*. Rice fields in surrounding areas.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 520 ha was established in November 1966, and in September 1967 this area was further designated as a Natural Monument under the Cultural Properties Preservation Law. In August 1973, a slightly larger area of 559 ha was designated as a Prefecture Nature Conservation Area. Subsequently, in November 1982, this area was incorporated in a newly designated National Wildlife Protection Area of 1,450 ha. The latter includes a 920 ha Special Protection Area which will remain in force until October 2002. The Nature Conservation Area of 559 ha, which includes both lakes and their surrounding marshes, was listed under the Ramsar Convention in September 1985.

**Conservation measures proposed:** Management plans include a project for the recovery of the *Nelumbo nucifera* vegetation.

**Land use:** Commercial fishing, sport fishing, other forms of outdoor recreation such as bird-watching, and conservation education. There is a sewage disposal plant, rice cultivation and some private housing in surrounding areas.

**Disturbances and threats:** The increase in road construction and housing development, and consequent loss of rice paddies, are reducing the extent of feeding habitat for the wintering geese. Water pollution has caused a problem, and this is being investigated by the Environment Agency.

**Economic and social values:** The lakes support a small commercial fishery, provide opportunities for outdoor recreation and conservation education, and attract large numbers of visitors every year to view the waterfowl.

**Fauna:** The lakes, marshes and surrounding rice paddies constitute an extremely important breeding, staging and wintering area for a wide variety of water birds. The wetlands are particularly important for wintering White-fronted Geese *Anser albifrons* and Bean Geese *A. fabalis*. The annual mid-winter count of January 1986 included:

13,225 *Anser albifrons*

4,602 *A. fabalis*

458 *Cygnus cygnus*

5,332 *Anas acuta*

1,747 *Anas platyrhynchos*

187 *Mergus merganser*

The flocks of *A. albifrons* and *A. fabalis* are much the largest concentrations of these species in Japan. For the past ten years or more this has been the only regular wintering site in Japan for *Branta canadensis*, although the number of birds involved has been very small. Other species of geese observed in winter include *Anser erythropus*, *A. caerulescens* and *Branta bernicla*. Various raptors also occur in winter, including *Haliaeetus pelagicus*, *H. albicilla*, *Buteo buteo*, *Accipiter gentilis*, *Circus aeruginosus* and *Falco peregrinus*.

Breeding birds include *Tachybaptus ruficollis*, *Anas poecilorhyncha*, *Porzana fusca*, *Gallinula chloropus*, *Fulica atra* and a variety of wetland passerines such as *Acrocephalus orientalis*, *A. bistrigiceps* and *Cisticola juncidis*. The wetland is important as a staging area for migrating herons, notably *Botaurus stellaris*, and shorebirds, notably *Pluvialis dominica*, *Tringa hypoleucos* and *Gallinago gallinago*. During the autumn migration season, the reed-beds are used as a roost by large numbers of Sand Martins *Riparia riparia*. In all, about 200 species of birds have been recorded at the wetland.

Twenty species of fishes are known to occur, including *Gnathopogon elongatus*, *Biwia zezera*, *Pseudorasbora parva*, *Carassius sp.*, *Rhodeus ocellatus* and *Channa gargus*.

**Special floral values:** No information.

**Research and facilities:** The avifauna of the area has been well documented, and there have been numerous censuses of the wintering waterfowl, particularly the geese. Observation facilities have been constructed.

**References:** Environment Agency (1972-1984); IUCN Conservation Monitoring Centre (1987); Karpowicz (1985); Miyagi Chapter of WBSJ (1982); Nature Conservation Society of Japan (1973); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2c, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Kasumigaura and Ukishima Marsh

**Country:** Japan

**Coordinates:** 35°57'N, 140°28'E;

**Location:** near Sakuragawa Village, Ibaraki Prefecture, 60 km northeast of Tokyo, Honshu.

**Area:** 16,878 ha (Lake Kasumigaura 16,868 ha including Ukishima Marsh 60 ha).

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 11 & 14.

**Description** of site: A large freshwater lake, the second largest freshwater lake in Japan, with some fringing marshes but now mostly surrounded by concrete banks, and Ukishima Marsh (60 ha), an alluvial marsh formed at the mouth of a river at the south end of the lake and extending like a tongue into the river mouth. A road runs along the concrete riverbank and crosses the marsh on a bridge.

Areas adjacent to the marsh are mainly under cultivation for rice. The lake is fed by 33 rivers and streams, and drains southwest in a single channel. The average depth of the lake is 3.4m, the maximum 7m, and the pH 9.0. The water level fluctuates considerably according to demand for agricultural, industrial and domestic use.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,281 mm, a mean annual temperature of 14.3°C, and a minimum temperature of -12.1°C.

**Principal vegetation:** Extensive reed-beds of *Phragmites communis*, with a rich growth of marsh grasses in early spring; rice paddies in surrounding areas.

**Land tenure:** Mainly state owned with some private and joint ownership.

**Conservation measures taken:** Four Prefecture Wildlife Protection Areas have been established: Takahama (460 ha), Lake Kasumigaura (5,290 ha), Ushibori (1,120 ha) and Ukishima (300 ha).

**Land use:** Commercial fishing, carp culture, sport fishing and pleasure boating, including sailing, motor-boating and sight-seeing cruises. Cultivated land, particularly rice fields, and residential housing in surrounding areas.

**Disturbances and threats:** The lake is actively managed for carp production, and this has caused considerable water pollution. There is also some pollution from domestic sewage.

**Economic and social values:** The lake supports an important fishery and provides many opportunities for outdoor recreation.

**Fauna:** The lake is an extremely important wintering area for waterfowl, and the associated marshes, particularly Ukishima, provide breeding areas for many marsh-nesting birds. A total of 41,360 waterfowl were observed during the annual mid-winter count of 1986 including:

4,574 *Anas platyrhynchos*

3,297 *A. crecca*

1,297 *A. penelope*

952 *A. poecilorhyncha*

398 *Fulica atra*

Up to 100 *Anser albifrons* have occurred at the lake. Breeding species include *Ixobrychus eurhythmus*, *I. sinensis*, *Porzana fusca*, *Acrocephalus (arundinaceus) orientalis*, *A. bistrigiceps* and *Emberiza yessoensis*. The many raptors recorded in the area include *Pandion haliaetus*, *Haliaeetus pelagicus*, *H. albicilla*, *Accipiter gentilis*, *Circus aeruginosus*, *C. cyaneus*, *C. melanoleucos* and *Falco peregrinus*.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out.

**References:** Environment Agency (1972-1984); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2c, 3a.

**Source:** IWRB Japan Committee.

**Wetland name:** Inner Bay of Tokyo

**Country:** Japan

**Coordinates:** 35°20'-35°42'N, 139°38'-140°08'E;

**Location:** on the south-central coast of Honshu, almost completely surrounded by the conurbation of Tokyo, Yokohama and Chiba, Tokyo Metropolis and Chiba and Kanagawa Prefectures.

**Area:** c.1,850 ha of mudflats and marshes in a total bay area of c.85,000 ha.

**Altitude:** 0-2m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 02, 05, 06, 08 & 15.

**Description of site:** The inner part of Tokyo Bay and the remaining associated marshes. Reclamation in Tokyo Bay, the most intensively developed bay in Japan, has resulted in the disappearance of most of the natural coastline in the inner bay area with the exception of the estuary and shore of the Obitsu River in the east. Within the reclaimed area, there still remains a natural tidal mudflat surrounded by concrete banks in the housing district of Yatsu, and an artificial lagoon with tidal mudflats has been created in the waterfowl reserve at Shinhama. There is a small artificial pond created for waterfowl in Oi Bird Park, and an artificial tidal mudflat extends beyond the reclaimed land at Kasai. To the west, near the mouth of the Tama River, small marshes persist on sand banks in the river and along the concrete riverbank. All other coastal areas and reclaimed lands have been used as building sites for factories, warehouses and other port facilities. The maximum tidal rise and fall at Harumi on the northwest shore of the bay is about 2m.

The most important areas for wildlife are as follows:

a) The Estuary of the Obitsu River: 35°24'N, 139°54'E; on the northeast shore of the bay, near Egawa, Kisarazu City, Chiba Prefecture; 43 ha of marsh and about 460 ha of tidal mudflats. A small area of estuarine marshes adjacent to a large area of intertidal mudflats which extend for 10 km either side of the estuary and up to two km offshore at low tide. With a total area of 1,200 ha, this is now the largest area of mudflats in Tokyo Bay. There are some rice paddies inland from the marsh.

b) Yatsu Tidal Mudflat: 35°40'N, 140°01'E; at the north end of the bay, near Narashino

City, Chiba Prefecture; 50 ha. A small tidal mudflat surrounded by a concrete bank and connected to Tokyo Bay by a narrow channel. There is a small area of brackish marshes with reed-beds around the edge of the mudflat. The times of the tides differ by approximately two hours from those of Tokyo Bay.

c) Gyotoku (Shinhama Waterbird Reserve): 35°40'N, 139°55'E; at the north end of the bay, near Ichikawa City, Chiba Prefecture; 83 ha including 9 ha of mudflats at low tide. A tidal saltwater lagoon with surrounding mudflats exposed at low tide, a freshwater pond and a small freshwater marsh, created on reclaimed land. The lagoon is connected to Tokyo Bay by a narrow channel. The maximum depth of water is 6m, and the average tidal rise and fall is 10 cm (maximum 138 cm).

d) Kasai Beach: 35°38'N, 139°52'E; on the northwest shore of the bay, at Edogawa-Ku, Tokyo Metropolis; 442.5 ha. A narrow sandy beach and adjacent tidal mudflat created artificially off an area of reclaimed land. At low tide, the mudflat extends 0.5 km offshore, and a muddy shoal is exposed about two km further out in the bay.

e) The Estuary of the Tama River: 39°32'N, 139°45'E; on the west shore of the bay, on the boundary of Tokyo Metropolis and Kanagawa Prefecture; approximately five km of river. A small area of brackish marshes, mainly reed-beds, on the sand and mud banks near the mouth of the Tama River, and adjacent mudflats exposed at low tide. There are roads along the concrete river banks and a bridge crosses the river upstream. The river flows through urban areas, and there is a large airport (Haneda) adjacent to the river mouth.

**Climatic conditions:** Temperate climate with the average annual rainfall ranging from 1,289 mm at Yatsu and Gyotoku to 1,536 mm at the Obitsu Estuary, and mean annual temperatures ranging from 14.7°C at Yatsu and Gyotoku to 15.6°C at Kasai and the Tama Estuary.

**Principal vegetation:** The dominant marsh vegetation in the Obitsu Estuary and at Yatsu Tidal Mudflat is *Phragmites communis*.

**Land tenure:** Mainly state and public ownership.

**Conservation measures taken:** No-Shooting Areas have been established at the Obitsu River Estuary and Yatsu Tidal Mudflat, and in part of the Kasai Beach area. A Prefecture Wildlife Protection Area of 56 ha was established at Gyotoku (the Shinhama Waterbird Reserve) in November 1979 and will be in force until October 1989. A Wildlife Protection Area (Tokyo Metropolis and

Kanagawa Prefecture) of 5,310 ha was established at the Tama River Estuary in September 1986 and will be in force until October 1996.

**Conservation measures proposed:** A proposal to create a Prefecture Wildlife Protection Area of approximately 200 ha at the Obitsu River Estuary has met with local opposition. Proposals have also been made to create a National Wildlife Protection Area and Wild Bird Park at Yatsu Tidal Mudflat, and to create a Wild Bird Park at Kasai Beach.

**Land use:** Outdoor recreation, mainly bird-watching and sport fishing. Surrounding areas are almost entirely industrial and residential, although there is still some cultivation of rice along the estuary of the Obitsu River.

**Disturbances and threats:** The entire area is threatened by pollution from domestic and industrial waste. A plan exists to construct a bridge across Tokyo Bay at the Obitsu River.

**Economic and social values:** No information.

**Fauna:** The inner area of Tokyo Bay remains an extremely important staging and wintering area for migratory waterfowl, despite the fact that it is in a megalopolis. The bay is particularly important for wintering ducks; over 47,900 were counted during the annual mid-winter census of 1986, including 40,900 *Aythya mania*, 4,230 *Anas acuta* and 2,740 *A. penelope*. Only a part of the bay was covered during the census, and it is thought that many more ducks winter in the area. The bay is also very important as a staging area for migratory shorebirds. In autumn 1983, over 2,650 shorebirds were recorded at the five wetlands described above. These included 1,820 *Charadrius alexandrinus*, 250 *C. mongolus* and 220 *Pluvialis squatarola*. A large number of *Calidris alpina* overwinter in the Bay, and approximately 6,000 have been counted at the Obitsu Estuary. *C. alexandrinus* breeds along the river banks and on reclaimed land. Other species which breed in the area include *Nycticorax nycticorax* and *Egretta garzetta* at Shinhama, and *Himantopus himantopus* at Gytoku, now the only known breeding site for this species in Japan. A variety of birds of prey are regular in the area, such as *Pandion haliaetus*, *Circus aeruginosus*, *C. cyaneus*, *Falco columbarius*, *F. peregrinus* and the owls *Asio flammeus* and *A. otus*.

Rare or unusual species which have been observed include *Tadorna ferruginea*, *Haematopus ostralegus*, *Tringa guttifer*, *Limnodromus semipalmatus*, *L. scolopaceus*, *Calidris mauri*, *Eurynorhynchus pygmeus* and *Larus saundersi*.

**Special floral values:** None known.

**Research and facilities:** Very sophisticated observation facilities have been provided at the Shinhama Water bird Reserve and at Oi Bird Park, and numerous surveys and censuses of the waterfowl populations have been carried out.

**References:** Environment Agency (1972-1984); Tokyo Environmental Pollution Bureau (1974); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 2c, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Kahokugata Lake and Reclamation Area

**Country:** Japan

**Coordinates:** 36°39'N, 136°40'E;

**Location:** Uchinada, Tsubata and Unoki-Machi, 5 km north of Kanazawa City, Ishikawa Prefecture, Honshu.

**Area:** 2,315 ha (lake 817 ha, reclaimed land 1,498 ha). **Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 16, 19 & 20.

**Description of site:** An area of reclaimed land and fresh to brackish marshes around a brackish lake. The original lake of about 2,400 ha was reduced to 817 ha by a reclamation project, which was initiated in 1963 and created 1,498 ha of farmland (pastures, rice paddies and arable land) by 1970. There are scattered patches of marsh around the lake, and areas of mudflat along the western

(seaward) shore. The lake is fed by six small rivers, and drains into the Sea of Japan via a channel through the intervening forested dunes. The average depth of the lake is 2m, the maximum depth 6.5m, the salinity 0.79 p.p.t. and the pH 7.6.

**Climatic conditions:** Temperate climate with an average annual rainfall of 2,415 mm and a mean annual temperature of 13.4°C.

**Principal vegetation:** The aquatic vegetation includes *Typha angustata*, *Hydrocharis morsusranae*, *Potamogeton oxyphyllus*, *P. crispus*, *Hydrilla varticillata* and *Phragmites communis*. There are large areas of rice fields and some pastures on the reclaimed land, and plantations of Acacias and Black Pines in the adjacent sand dunes.

**Land tenure:** The lake is state owned; the reclamation area is mostly under private ownership.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 442 ha was established at the lake in November 1983 and will be in force until October 1993. A No-Shooting Area has also been established.

**Land use:** Commercial and sport fishing in the lake; grazing of domestic livestock and agriculture, principally cultivation of rice, on the reclaimed land.

**Disturbances and threats:** Areas of marsh on the reclaimed land are being converted to pasture land for dairy farming.

**Economic and social values:** The lake supports a small commercial fishery.

**Fauna:** An extremely important staging area for migratory waterfowl, particularly shorebirds, and an important wintering area for Anatidae and some shorebirds. Thirty-nine species of shorebirds have been recorded in the area including large numbers of *Tringa erythropus* and *Calidris alpina*, and several rare species such as *Philomachus pugnax*, *Limnodromus scolopaceus* and *Calidris ptilocnemis*. Many *C. alpina* overwinter, and some *Vanellus vanellus* breed. Over 21, 20 waterfowl were recorded during the annual mid-winter census in 1986, including:

200 *Cygnus columbianus*

16,000 *Anas platyrhynchos*

1,050 *A. poecilorhyncha*

1,100 *A. crecca*

150 *A. penelope*

237 *Mergus merganser*

91 *M. albellus*

A number of species which are uncommon in Japan, for example *Botaurus stellaris*, *Ardeola bacchus*, *Ardea purpurea*, *Anas formosa*, *Haliaeetus pelagicus*, *H. albicilla*, *Buteo lagopus* and *Falco peregrinus*, occur in the area, particularly in winter, and *Circus aeruginosus* is known to breed.

The fish fauna includes *Carassius sp.*, *Cyprinus carpio*, *Tridentiger obscurus* and *Chaenogobius annularis*.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses have been carried out, and observation facilities have been constructed by the Prefecture Government.

**References:** Environment Agency (1972-1984); Nakamura (1975); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 2b, 2c, 3a.

**Source:** IWRB Japan Committee.

**Wetland name:** Katano-Kamoike Pond

**Country:** Japan

**Coordinates:** 36°19'N, 136°17'E;

**Location:** Katano-Cho, Kaga City, 40 km southwest of Kanazawa, Ishikawa Prefecture, Honshu.

**Area:** 9.6 ha.

**Altitude:** 5-10m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 15 & 19.

**Description of site:** A small freshwater pond, associated marshes and rice paddies surrounded by low wooded hills. In summer, the pond covers about 2.3 ha. Fresh water flows into the pond via a channel from the nearby Shimofukuda Reservoir. After the rice harvest in autumn, the pond is dammed; the surrounding marshes and rice paddies are partially flooded, the surface area increases to about 7 ha, and the pond reaches a maximum depth of 2.5m. The water level is lowered again in spring for the next rice crop. In recent years, many of the rice fields have been abandoned and have reverted to marsh.

**Climatic conditions:** Temperate climate with an average annual rainfall of 2,320 mm and a mean annual temperature of 14.4°C.

**Principal vegetation:** The pond vegetation includes *Nuphar japonicum*, *Nymphaea tetragona*, *Zizania latifolia*, *Oryza sativa* and *Trapa natans*. There are 1.6 ha of reed-beds (*Phragmites communis*) and several hectares of rice paddies. Pines have been planted on the sandy hills to the east of the lake, to act as a windbreak, and there is mixed woodland of pines, *Chinquapin sp* and *Machilus thunbergii* on the other hills around the wetland.

**Land tenure:** Privately owned.

**Conservation measures taken:** A Prefecture Special Wildlife Protection Area of 10 ha was established in November 1988 for ten years. The wetland and part of the surrounding hills have been included in a sanctuary (Nature Centre) of 9.6 ha established in 1984 by the Kaga City Government. This is the third such sanctuary to be established in Japan.

**Conservation measures proposed:** There is a plan to enlarge the sanctuary to incorporate more of the surrounding areas.

**Land use:** Bird-watching at the Nature Centre, and rice cultivation in summer. Agriculture, mainly rice cultivation and orchards, and duck hunting, using a traditional netting technique, in surrounding areas.

**Disturbances and threats:** The amount of foraging habitat for waterfowl has been decreasing; there is a plan to modify the nearby river to accelerate drainage, and residential areas in the vicinity are expanding. In the adjacent hill ranges, licenced duck hunters belonging to a local duck-hunting association use a traditional netting technique to trap waterfowl.

**Economic and social values:** A popular area for outdoor recreation, particularly bird-watching.

**Fauna:** An extremely important wintering area for ducks and the third most important wintering area for geese in Japan. The first waterfowl arrive in late September, and most leave in late March. Peak mid-winter counts have included over 950 *Anser albifrons*, 240 *A. fabalis*, 9,000 *Anas platyrhynchos* and large numbers of *A.formosa*, *A. poecilorhyncha* and *A. penelope*. The numbers of waterfowl usually increase during the open hunting season when the sanctuary provides an important refuge from hunting. Of the 149 species of birds recorded in the sanctuary, 90 are waterbirds. The sanctuary is rich in raptors which prey on the waterfowl, notably *Haliaeetus pelagicus*, *H. albicilla*, *Accipiter gentilis* and *Circus aeruginosus*.

**Special floral values:** No information.

**Research and facilities:** The avifauna has been well documented, and regular waterfowl censuses have been carried out. Observation facilities have been provided by the Kaga City Government, and the Wild Bird Society of Japan maintains a professional manager at the site.

**References:** Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** lb. 2a, 2b, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Hamana

**Country:** Japan

**Coordinates:** 34°45'N, 137°35'E;

**Location:** 10 km west of Hamamatsu, Hamamatsu and Kosei Cities, Shizuoka Prefecture, Honshu.

**Area:** 6,605 ha.

**Altitude :**Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 06 & 08.

**Description of site:** A large saline coastal lagoon with a surrounding belt of marshes (except in the south) and some intertidal mudflats, particularly near the mouth of the wide tidal channel which connects the lagoon to the sea. A number of eel culture ponds have been constructed on the shores of the lake, especially along the southern (seaward) side. Concrete embankments with roads on top almost encircle the lake, and the tidal channel is crossed by several roads and railway lines. The lake is fed by 13 small rivers and streams; it has an average depth of 4.8m, a maximum depth of 16.6m, a salinity of 16.6 p.p.t., and a pH of 8.4. The lake basin is bounded to the north and west by low hill ranges.

**Climatic conditions:** Temperate climate with an annual rainfall of 1,800-2,040 mm and a mean annual temperature of 16.3°C.

**Principal vegetation:** The dominant aquatic plants are *Phragmites communis*, *P. japonica*, *Zizania latifolia*, *Scirpus lacustris*, *Typha latifolia*, *Zostera marina* and *Myriophyllum sp.* There are some rice fields in surrounding areas.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** The lake is included within a Prefecture Park.

**Land use:** Commercial fishing; aquaculture for eels and oysters; outdoor recreation including sport fishing, bathing, motor-boating and pleasure cruising. Rice cultivation, aquaculture and residential housing in surrounding areas.

**Disturbances and threats:** "Red tides" have occurred on a small scale in the western part of the lake.

**Economic and social values:** The lake supports a commercial fishery and is very popular for outdoor recreation.

**Fauna:** An extremely important staging area for migratory shorebirds and a very important wintering area for ducks. Thirty-seven species of shorebirds have been recorded, the commoner species including *Calidris ruficollis*, *C. alpina*, *C. ferruginea*, *C. alba*, *Arenaria interpres* and *Vanellus cinereus*. Twenty species of ducks were recorded during the annual mid-winter census of 1986, including:

over 31,100 *Aythya manila*

7,000 *A. ferina*

4,350 *A. fuligula*

5,870 *Anas acuta*

1,440 *A. falcata*

2,280 *A. platyrhynchos*

1,810 *A. penelope*

1,160 *A. clypeata*

Other species of regular occurrence include *Sterna hirundo*, *S. albifrons* 5 many gulls (*Larus spp*), *Pandion haliaetus*, *Haliaeetus albicilla* and *Falco subbuteo*. Some 159 species of fishes have been recorded including *Anguilla japonica*, *Acanthogobius flavitnanus*, *Konosirus punctatus*, *Plecoglossus altivelis* and *Tridentiger obscurus*. The invertebrate fauna of the lake is rich in shrimps, crabs, shellfish and aquatic insects.

**Special floral values:** No information.

**Research and facilities:** The avifauna is well documented, and annual mid-winter waterfowlcensuses have been carried out.

**References:** Environment Agency (1972-1984); Wild Bird Society of Japan (1982-85 & 1982-86).

**Criteria for inclusion:** lb. 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Shiokawa Tidal Flats

**Country:** Japan

**Coordinates:** 34°41'N, 137°17'E;

**Location:** Sugiyama-Cho, 10 km west of Toyohashi City, Atsumi-Gun, Aichi Prefecture, Honshu.

**Area:** c.280 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02 & 06.

**Description of site:** An area of estuarine intertidal mudflats in the shape of a lagoon, surrounded by a concrete embankment which protects the adjacent reclaimed land. The mudflats are connected to the sea via a tidal channel crossed by a road bridge near the mudflats. There are several eel culture ponds along the inner coast of the mudflats, some uncultivated grassy areas with shallow ponds adjacent to the tidal channel, and extensive rice paddies in surrounding areas.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,867 mm and a mean annual temperature of 15.4°C.

**Principal vegetation:** Little vegetation on the mudflats; some freshwater marshes and rice paddies in surrounding areas.

**Land tenure:** State owned.

**Conservation measures taken:** The wetland has been designated as a No-Shooting Area from November 1986 to October 1996.

**Conservation measures proposed:** A proposal has been made for the establishment of a National Wildlife Protection Area as a reserve for migratory birds.

**Land use:** None at the mudflats; aquaculture for eels, agriculture (mainly rice but also some other crops), and industrial development in surrounding areas.

**Disturbances and threats:** Reclamation of land for agricultural and industrial development poses a threat to the wetland.

**Economic and social values:** No information.

**Fauna:** The mudflats and adjacent sea area constitute one of the most important staging and wintering areas for waterfowl, particularly ducks and shorebirds, on the Pacific coast of central Japan. During the peak of the migration season, the shorebirds present at any one time can include between 2,000 and 9,000 *Calidris alpina*, between 500 and 2,000 *Charadrius alexandrinus*, *Calidris ruficollis*, and between 100 and 500 *Vanellus cinereus*, *Pluvialis dominica*, *P. squatarola*, *Charadrius mongolus*, *Numenius phaeopus*, *Tringa erythropus*, *T. nebularia*, *T. glareola*, *Heteroscelus brevipes* and *Calidris acuminata*. Fifty-one species of shorebirds have been recorded, including such rarities as *Recurvirostra avosetta* and *Calidris mauri*. Some 1,000-2,000 *Calidris alpina* overwinter in the area, and *Charadrius alexandrinus* and *Glareola maldivarum* breed. Wintering concentrations of Anatidae are spectacular; over 71,500 ducks were recorded during the annual mid-winter count of 1982, including:

55,000 *Aythya mania*

6,265 *A. ferina*

5,660 *Anas acuta*

1,200 *A. poecilorhyncha*

1,190 *A. crecca*

1,140 *A. platyrhynchos*

650 *Aythya fuligula*

Large numbers of gulls (*Larus* spp) visit the area in winter, and *Sterna hirundo* is a common passage migrant in spring and autumn. *Haliaeetus pelagicus* and *Falco peregrinus* have occurred.

**Special floral values:** No information.

**Research and facilities:** Regular censuses are made of the ducks and shorebirds.

**References:** Environment Agency (1972-1984); Society for the Protection of Shiokawa Flats (1975); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 2c, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Shonai-Fujimae Tidal Flats and other areas in Inner Ise Bay

**Country:** Japan

**Coordinates:** 35°04'N, 136°50'E;

**Location:** Shonai-Fujimae Tidal Flats: 35°04'N, 136°50'E; Minatu-ku, in the port area of Nagoya, 12.5 km southwest of the city centre. Nabeta Reclamation Area: 35°02'N, 136°46'E; Kisozaki-mura, 15 km southwest of Nagoya. Aichi Prefecture, Honshu.

**Area:** Shonai-Fujimae Tidal Flats, c.300 ha including 120 ha of mudflats; Nabeta Reclamation Area, 374 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 02, 06, 15 & 20.

**Description of site:** Several patches of intertidal mudflats in the lower estuaries of the Shonai and Nikko Rivers, in the port area of Nagoya City at the head of Ise Bay. The maximum tidal range is about three metres. These are the only natural tidal mudflats which now remain in the Kiso River Delta area; as recently as the 1950s there were several thousand hectares of mudflats but almost all have been reclaimed for industrial development around Nagoya Port. Nabeta Reclamation Area is an area of wet farmland with some freshwater marshes, adjacent to the northern edge of Ise Bay. The area was reclaimed from the bay in 1963.

**Climatic conditions:** Temperate climate with an average annual rainfall of about 1,850 mm, a mean annual temperature of 15.2°C, and a minimum temperature of -6.9°C.

**Principal vegetation:** No information.

**Land tenure:** Partly state and partly public ownership.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 220 ha was established in the Shonai Estuary in November 1980 and will be effective until October 1990. A No-Hunting Area of 250 ha was established in the Nikko Estuary in November 1984; this includes Fujimae Tidal Flats. Shooting is prohibited on the Nabeta Reclamation Area.

**Conservation measures proposed:** A proposal has been made to upgrade the existing No-Hunting Area to a Bird Protection Area.

**Land use:** None at the tidal flats; Nagoya Port industrial area, a container berth, a shipyard and a recreation zone in surrounding areas. Possible changes in land use: Nagoya City Government has drawn up a project to use 105 ha of Fujimae Tidal Flats as a garbage dump and eventually reclaim the land for development. Approval for the project is expected in 1987 or 1988, and dumping is scheduled to begin in 1990. A major campaign to oppose this project was launched in 1987 by the Nagoya Council for the Conservation of Tidal Flats, and several alternative solutions to the problem of garbage disposal have been put forward.

**Disturbances and threats:** The dumping of garbage as proposed by Nagoya City Government would effectively eliminate the tidal flats of Fujimae and the Shonai Estuary, and thereby destroy an important feeding area for migratory shorebirds. A serious pollution problem is likely to arise with the dumping, and the natural water purification functions of the mudflat ecosystem would be lost.

**Economic and social values:** The tidal mudflats serve a valuable function in water purification and provide a nursery for fisheries. The mudflats are the best bird-watching locality in Nagoya City, and are within easy reach of millions of people, so their potential for conservation education and scientific research is very great.

**Fauna:** The tidal flats are an extremely important feeding and roosting area for migratory waterfowl, notably *Phalacrocorax carbo* (maximum count 1,668), herons and egrets (8 species, maximum 616), ducks (19 species, maximum 29,466), shorebirds (34 species, maximum 10,167) and gulls and terns (10 species, maximum 3,772). The concentrations of shorebirds are amongst the highest found in Japan, and in late April in recent years, the site has held 10-15% of the *Pluvialis squatarola*, *Limosa lapponica*, *Calidris ruficollis* and *C. alpina* recorded in Japan at that time (based on censuses at over 500 localities).

Nabeta Reclamation Area is a breeding area for *Circus aeruginosus*, a staging area for migratory shorebirds, and a wintering area for ducks, notably *Anas formosa*. Apparently several thousand *A. formosa* once wintered in this area, but numbers have decreased greatly in recent years.

**Special floral values:** None known.

**Research and facilities:** Detailed studies have been carried out on the birds of the area, and regular censuses have been made. Observation facilities have been provided by Nagoya City Government at the Shonai River, and an observation centre has been established by Aichi Prefecture Government at Nabeta Bird Park.

**References:** Aichi Society for the Study of Bird Protection (1980); Anon (1977); Wild Bird Society of Japan (1982-85).

**Criteria for inclusion:** 3a, 3c.

**Source:** Atsuo Tsuji (Nagoya Council for the Conservation of Tidal Flats) and IWRB Japan Committee.

**Wetland name: The Confluence of the Kiso Rivers**

**Country:** Japan

**Coordinates:** 35°05'-35°15'N, 136°40'E;

**Location:** 20 km west of Nagoya, on the boundaries of Gifu, Aichi and Mie Prefectures, Honshu.

**Area:** Approximately 13 km of rivers.

**Altitude:** 0-3m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 11, 13 & 18.

**Description of site:** A network of river channels, streams, riverine marshes and marshy grassland extending from the confluence of two large rivers in the north downstream for about 13 km to their confluence with a third river in the south. For about 10 km of this stretch, the main river is split into two parallel channels with fringing riverine marshes. There are extensive marshy pastures between and on either side of the river channels, and large areas of rice paddies with scattered dwellings along both sides of the wetland. A road bridge crosses the rivers upstream of the marshes, and the rivers eventually flow into Ise Bay, a further 13 km to the south.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,858 mm and a mean annual temperature of 15.2°C (minimum -6.9°C).

**Principal vegetation:** The dominant vegetation throughout the wetland is reed-bed of *Phragmites communis*.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** None.

**Land use:** Grazing of domestic livestock in the marshes; rice cultivation and housing estates in the surrounding areas.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** An extremely important wintering area for Anatidae. Over 7,900 ducks were recorded during the annual mid-winter census of 1982, including:

2,490 *Anas platyrhynchos*

2,250 *A. acuta*

1,610 *A. crecca*

1,140 *A. poecilorhyncha*

190 *A. formosa*

140 *Aythya fuligula*

The numbers do, however, vary from season to season, and many more ducks are known to visit the area at times. Other common wintering species include *Phalacrocorax carbo*, *Ardea cinerea* and *Larus ridibundus*. The marshes support a breeding population of *Acrocephalus (arundinaceus) orientalis*, and the buntings *Emberiza rustica* and *E. schoeniclus* occur in winter. Many species of raptors have been recorded; *Haliaeetus albicilla*, *Circus cyaneus*, *C. aeruginosus*, *Accipiter gentilis* and *Falco peregrinus* are regular, and *Haliaeetus pelagicus* and *Buteo lagopus* have occurred.

**Special floral values:** No information.

**Research and facilities:** Regular waterfowl censuses are carried out in winter.

**References:** Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2a, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Biwa

**Country:** Japan

**Coordinates:** 35°15'N, 135°05'E;

**Location:**otsu, Hikone, Kusatsu and Omihachiman City, Shiga Prefecture, 60km northeast of Osaka, Honshu.

**Area:** 67,380ha.

**Altitude:** 86m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A large freshwater lake and associated marshes, the largest freshwater lake in Japan and one of the few lakes of preglacial origin. It lies in the centre of a large basin and was formed by upwarping around the perimeter. Most of the lake is oligotrophic, but the southern (lower) basin is eutrophic. The lake has two islands, one in the north and a second near the southeast shore, and there are extensive marshes along the eastern shore. The lake is fed by some 120 rivers and streams, and drains southwest via a large river into Osaka Bay.

Most of the basin is now cultivated, particularly to the east of the lake; there are large urban areas in the south, and scattered towns and villages elsewhere except in the mountainous regions to the north and along parts of the western shore. Tourist resorts and recreation facilities are dotted along the shoreline. The average depth of the lake is 41.2m, the maximum depth 103.6m, the salinity 0.0084 p.p.t., and the pH 7.0-8.5.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,834 mm and a mean annual temperature of 15.0°C.

**Principal vegetation:** The dominant lake and marsh vegetation includes *Phragmites communis*, *Zizania latifolia*, *Typha latifolia*, *Hydrilla verticillata*, *Ceratophyllum demersum*, *Eichhornia crassipes*, *Trapa natans* and *Nymphoides peltata*.

**Land tenure:** State owned.

**Conservation measures taken:** The lake has been designated as a Park by the State, but is not a National Park in its strict sense. It has also been declared a Prefecture Wildlife Protection Area (69,546 ha) for the period November 1981 to October 1991.

**Land use:** Commercial fishing, fish culture, water supply for irrigation, and outdoor recreation including sport fishing, motor-boating, pleasure cruising and bathing. Agriculture, private housing and tourism in surrounding areas.

**Disturbances and threats:** Intensive exploitation of the resources of the lake and surrounding areas, and pollution from domestic sewage and general rubbish, have seriously affected water quality and the fishery resource. The problem is particularly serious in the southern basin where eutrophication is taking place. "Red tides" have occurred in recent years.

**Economic and social values:** The lake supports an important commercial fishery and is extremely popular for outdoor recreation.

**Fauna:** An extremely important breeding and wintering area for a wide variety of resident and migratory waterfowl. *Tachybaptus ruficollis* is a common resident, and there is a breeding colony of *Phalacrocorax carbo* on the island near the north end of the lake. *Acrocephalus (arundinaceus) orientalis* breeds in the marshes, and there are recent reports of breeding *Botaurus stellaris* and *Circus aeruginosus*. Large numbers of waterfowl winter at the lake; in the winter of 1971/1972, 60,000-70,000 birds were present, including about 1,750 *Tachybaptus ruficollis*, 45,000 ducks and 65 *Anser fabalis*. In 1986, 142 *Cygnus columbianus*, 260 *Anser fabalis* and large numbers of *Fulica atra* were recorded during the annual mid-winter census. A large number of *Larus ridibundus* also overwinter in the region. Fifty-two species of fish including many endemic species and subspecies have been recorded in the lake. These include *Salmo masou macrostomus*, *S. mykiss irideus*, *Plecoglossus altivelis*, *Parasilurus asotus*, *Anguilla japonica*, *Chaenogobius urotaenia isaza*, *C.*

urotaenia urotaenia and Carassius spp. Other interesting fauna includes Sinotaia histrica, Semisulcospira libertina, and a number of endemic invertebrates.

**Special floral values:** Several species of plants are endemic to the lake.

**Research and facilities:** A great deal of limnological work has been carried out at the lake, and the fauna and flora, including the plankton, have been well documented.

**References:** Environment Agency (1972-1984); Japanese Association for the Preservation of Birds (1980); Luther & Rzoska (1971); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1a, 2b, 2d, 3a.

**Source:** IWRB Japan Committee.

**Wetland name: Lake Shinji and Lake Nakaumi**

**Country:** Japan

**Coordinates:** Lake Shinji 35°26'N, 132°52'E; Lake Nakaumi 35°28'N, 133°11'E; Matsue,

**Location:** Sakaiminato, Yonago and Yasugi Cities, Shimane Prefecture, west and east of Matsue City respectively, Honshu.

**Area:** Lake Shinji 7,889 ha; Lake Nakanoumi 9,926 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 08.

**Description of site:** Two large brackish lakes situated some seven km apart and almost completely surrounded by concrete banks especially in the urban area between the two lakes. There are patches of marshes scattered along the concrete banks. A channel flows through Lake Shinji into Lake Nakaumi and from there into the sea. Lake Nakaumi has two islands, and is effectively divided into two parts by a road built on a causeway which crosses the lake via the two islands. Shinji is fed by 35 small rivers and streams, and Nakaumi by 37; the latter drains northeast via a short channel (five km) into the Sea of Japan. Lake Shinji has an average depth of 4.2m (maximum 5.7m), a salinity of 2.7 p.p.t. and a pH of 8.6; Lake Nakaumi has an average depth of six metres (maximum nine metres), a salinity of 11.0 p.p.t. and a pH of 8.4.

**Climatic conditions:** Temperate climate with an average annual rainfall of 1,993 mm and a mean annual temperature of 14.9°C (average minimum -8.7°C).

**Principal vegetation:** The dominant aquatic vegetation is *Phragmites communis*, *Zizania latifolia*, *Typha angustata* and *Potamogeton malaiianus*.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 8,800 ha has been established at Lake Shinji for the period November 1982 to October 1992, and a National Wildlife Protection Area has been established at Lake Nakaumi for the period November 1984 to October 1994.

**Land use:** Commercial fishing, aquaculture, sport fishing and other outdoor recreation at the lakes; agriculture, tourism and urban and residential development in surrounding areas.

**Disturbances and threats:** There is a considerable amount of water pollution from domestic sewage. There are plans to change both lakes from brackish water to fresh water, and to reclaim some parts of the wetlands for development.

**Economic and social values:** The lakes support a commercial fishery and provide many opportunities for outdoor recreation.

**Fauna:** One of the most important wintering areas for migratory waterfowl in western Honshu. Over 56,000 waterfowl were recorded on Lake Nakaumi during the annual mid-winter census of 1986, including:

160 *Cygnus columbianus*

15,520 *Aythya fuligula*

7,720 *A. ferina*

4,100 *A. mania*

800 *Anas poecilorhyncha*

Only half of the area was counted and it can be assumed that many more waterfowl overwinter at these lakes. In 1981, 626 *Cygnus columbianus* were recorded in the area. Many species of raptors have been observed including *Haliaeetus albicilla*, *Buteo hemilasius*, *B. lagopus*, *Circus cyaneus*, *C. aeruginosus* and *Falco peregrinus*. Eighty-one species of fishes are known to occur in Lake Nakaumi, and 23 in Lake Shinji. These include *Cyprinus carpio*, *Carassius sp* and *Saiax microdon*. The rich invertebrate fauna includes a wide variety of crabs, shrimps, shellfish and aquatic insects.

**Special floral values:** No information.

**Research and facilities:** The avifauna of the lakes has been well documented, and mid-winter waterfowl censuses are carried out annually.

**References:** Environment Agency (1972-1984); Shimane (1974); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name:** Ajisu Reclamation Area

**Country:** Japan

**Coordinates:** 34°00'N, 131°22'E;

**Location:** Ajisu-Machi, Yoshigi-Gun, Yamaguchi Prefecture, 40 km east of Shimonoseki, Honshu.

**Area:** 286 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02, 06, 18 & 19.

**Description of site:** An area of marshy grassland between two small estuaries, and the intertidal mudflats of the estuaries and the adjacent coast. In 1964, the marshes between the two estuaries were reclaimed for agricultural purposes, but the land has never been cultivated because the drainage scheme resulted in a shortage of water. Land on the hillsides beyond the wetland is cultivated for rice. The maximum tidal variation in the estuaries is 3m.

**Climatic conditions:** Temperate climate with an average annual rainfall of 2,000 mm and a mean annual temperature of 15.3°C (minimum -11.3°C).

**Principal vegetation:** Marshy grassland between the estuaries; rice paddies on the adjacent hills.

**Land tenure:** Owned by Yamaguchi Prefecture.

**Conservation measures taken:** None.

**Land use:** The harvesting of shellfish, sport fishing and bird-watching at the wetland; cultivation of rice and other crops in adjacent areas.

**Possible changes in land use:** There are plans to construct factories and leisure facilities in the area.

**Disturbances and threats:** The proposed industrial and recreational development would result in a loss of wetland habitat.

**Economic and social values:** No information.

**Fauna:** The reclaimed land, tidal mudflats and neighbouring coastal areas constitute an extremely important staging and wintering area for a wide variety of migratory waterfowl, particularly ducks and shorebirds. Fifty-three species of waterfowl have been recorded including 11 species of Anatidae and 28 species of shorebirds. The Anatidae include *Cygnus columbianus*, *Anas falcata*, *Mergus serrator*, and the shorebirds, *Glareola maldivarum*, *Tringa erythropus* and *Eurynorhynchus pygmeus*. Other interesting species recorded in the area include *Podiceps nigricollis*, *Botaurus*

*stellaris*, *Ixobrychus sinensis*, *Pandion haliaetus*, *Buteo hemilasius*, *Circus cyaneus*, *Falco peregrinus*, *Grus monacha*, *Lanius sphenocercus* and *Remiz pendulinus*.

**Special floral values:** No information.

**Research and facilities:** Bird censuses have been carried out. **References:** Wild Bird Society of Japan (1982-85 & 1982-86). **Criteria for inclusion:** 3a.

**Source:** IWRB Japan Committee.

**Wetland name:** The Estuary of the Yoshino River

**Country:** Japan

**Coordinates:** 34°05'N, 134°36'E;

**Location:** north of Tokushima City, Tokushima Prefecture, Shikoku.

**Area:** c.500 ha (4 km long and 1.0-1.36 km wide).

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02, 06 & 08.

**Description of site:** The estuarine system of the Yoshino River, with extensive intertidal mudflats, sand banks and brackish marshes along a 4 km stretch upstream from the river mouth. In the north, the riverbanks have been concreted over, and there is a road bridge over the river. In the south, the riverbanks abutt on arable land, rice fields, marshes and a golf course. There is heavy traffic of fishing boats near the mouth of the river.

**Climatic conditions:** Warm humid temperate climate.

Principal vegetation: The dominant marsh vegetation is *Phragmites communis*.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 500 ha has been established for the period November 1985 to October 1995.

**Land use:** There is a fishing port on the estuary, and local people harvest shellfish at low tide. Residential areas, cultivation of rice and other crops, and a golf course in adjacent areas.

**Disturbances and threats:** None known.

**Economic and social values:** No information.

**Fauna:** The estuarine mudflats are an extremely important staging and wintering area for migratory shorebirds and ducks, and the sand banks provide nesting habitat for *Charadrius alexandrinus* and *Sterna albifrons*. Twenty-four species of shorebirds were recorded during an autumn census in 1984, including 50 *Charadrius alexandrinus* and 35 *C. mongolus*; 14 species were recorded during the annual spring count in 1985, including 640 *Calidris alpina*, 51 *Numenius phaeopus* and 36 *Pluvialis squatarola*. A variety of rare and unusual species have been observed including *Haematopus ostralegus*, *Tringa guttifer* and *Eurynorhynchus pygmeus*. Over 4,500 ducks were present during the annual mid-winter count of 1986, including 2,760 *Anas Penelope*, 340 *A. platyrhynchos* and 230 *A. poecilorhyncha*. Other unusual visitors have included *Egretta eulophotes*, *Branta bernicla* and *Chlidonias leucoptera*. The marshes

support large breeding populations of *Acrocephalus (arundinaceus) orientalis* and *Cisticolajuncidis*.

**Special floral values:** No information.

**Research and facilities:** The avifauna has been well documented, and regular waterfowl censuses have been carried out.

**References:** Wild Bird Society of Japan (1982-85, 1982-86 & 1984). **Criteria for inclusion:** 1b. 3a.

**Source:** IWRB Japan Committee.

**Wetland name:** The Estuary of the Zuibaiji River and Hakata Bay

**Country:** Japan

**Coordinates:** 33°36'N, 130°15'E;

**Location:** Nishi-Ku, 15 km west of Fukuoka City, Fukuoka Prefecture, Kyushu.

**Area:** Zuibaiji Estuary c.120 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 02, 06 & 08.

**Description of site:** The estuarine system of the Zuibaiji River at the west side of Hakata Bay, with extensive mudflats in a tidal lagoon near the narrow river mouth. The estuary is surrounded by concrete banks, but there are some brackish marshes upstream along the river. The land adjacent to the estuary is a mainly rice paddy with several small ponds, and there are residential areas near the river mouth. The maximum tidal rise and fall is two metres. There are other important wetlands in the Hakata Bay area, such as Wajiro and the Muromi River Estuary.

**Climatic conditions:** Warm temperate climate with an average annual rainfall of 1,694 mm and a mean annual temperature of 16.3°C.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** The estuary is included in a Prefecture Wildlife Protection Area of 26,708 ha, which was established in November 1986 as a waterfowl reserve and will be in force until November 1996.

**Land use:** The cultivation of rice and lotus blossoms; residential areas nearby.

**Disturbances and threats:** There is a plan to reclaim some land in the eastern part of Hakata Bay.

**Economic and social values:** A popular area for bird-watching.

**Fauna:** Situated near the northern tip of Kyushu, the tidal mudflats provide an extremely important resting and feeding area for migratory waterfowl, particularly shorebirds, arriving from the Asian mainland. Hakata Bay is also one of the few areas with good tidal mudflats on the coast of the Sea of Japan. Shorebirds observed during the 1984 annual autumn count included:

42 *Charadrius alexandrinus*

58 *Tringa glareola*

20 *Xenus cinereus*

26 *Calidris ruficollis*

In spring 1985, the count included 86 *Tringa glareola*, 97 *Phalaropus lobatus* and 429 *Calidris alpina*. Some 200 species of birds have been recorded in the area, including many which are rare or unusual in Japan such as *Egretta eulophotes*, *Ardea purpurea*, *Ciconia nigra*, *Platalea minor*, *Threskiornis melanocephalus*, *Tadorna tadorna*, *T. ferruginea*, *Haliaeetus albicilla*, *Grus monacha*, *Amaurornis phoenicurus*, *Gallinago cinerea*, *Larus saundersi*, *Chlidonias hybrida* and *Emberiza pallasi*.

**Special floral values:** No information.

**Research and facilities:** The avifauna has been well documented and regular waterfowl censuses have been carried out.

**References:** Anon (1979); Environment Agency (1972-1984); Shiraishi *et al.* (1985); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2b, 2c, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Ariake Bay

**Country:** Japan

**Coordinates:** 33°00'N, 130°15'E;

**Location:** 50 km south of Nagasaki, Fukuoka, Kumamoto Prefecture, Kyushu.

**Area:** 180,000 ha (maximum of 30,800 ha of tidal mudflats).

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 02, 06 & 08.

**Description of site:** A large shallow sea bay with many estuaries and the largest area of intertidal mudflats in Japan. The mudflats extend in fingers for up to 7 km out from the estuaries of the many rivers entering the bay. The total area of mudflats continues to decrease as more and more land is retained within concrete banks and reclaimed for agriculture. There are still some patches of natural salt marsh on the shore of the bay, but now also many residential areas, particularly near the estuaries. The average depth of water in the bay is 20m (maximum of 130m), and the maximum tidal variation is 5-7m.

**Climatic conditions:** Warm temperate climate with an average annual rainfall of 1,932 mm, a mean annual temperature of 15.9°C, and an average minimum temperature of 10.9°C.

**Principal vegetation:** The dominant marsh vegetation is reed-beds of *Phragmites communis*.

**Land tenure:** The sea areas and intertidal mudflats are state owned; reclaimed land is mainly under private ownership.

**Conservation measures taken:** None.

**Conservation measures proposed:** There is a proposal to establish a National Wildlife Protection Area as a reserve for migratory waterfowl.

**Land use:** Commercial fishing in the bay; agriculture and residential areas on adjacent land.

**Disturbances and threats:** The construction of reservoirs and constant reclamation of coastal marshes and inshore mudflats for agricultural land not only reduces the extent of feeding habitat for waterfowl but also seriously reduces the areas above high water mark suitable as high tide roosts for shorebirds.

**Economic and social values:** The bay supports an important commercial fishery.

**Fauna:** The bay and its intertidal mudflats are so extensive that it has not been possible to carry out censuses of waterfowl over the whole area. However, censuses at the readily accessible sites have demonstrated the extreme importance of the area as a resting and feeding site for migratory shorebirds, and as a wintering area for ducks. Shorebird numbers are at their highest from August to October and in April and May. Counts made at a high tide roost on reclaimed land at Kokuzo in the north, at the height of the migration season, have included:

over 310 *Limosa limosa*

1,160 *L. lapponica*

740 *Numenius phaeopus*

5,130 *Calidris tenuirostris*

4,020 *C. alpina*

Counts at a roost on reclaimed land at Yamato in the northeast have included:

450 *Limosa limosa*

800 *Heteroscelus brevipes*

700 *Xenus cinereus*

3,000 *Calidris tenuirostris*

No less than 54 species of shorebirds (eight *Charadriidae* and 46 *Scolopacidae*) have been observed on reclaimed land at Yokoshima in the east. The 1986 annual mid-winter count of Anatidae on reclaimed land at Kokuzo included 1,865 *Anas Penelope* and 463 *A. crecca*. In view of the very limited coverage of the counts, the actual numbers of waterfowl present must be substantially higher. Interesting wintering species include *Tadorna tadorna*, *Larus saundersi* and a few *L. ichthyaetus*. Other unusual species recorded in the area include *Ardea purpurea*, *Ciconia (ciconia) boyciana*, *Platalea leucorodia*, *P. minor* and *Threskiornis melanocephalus*.

There are many indigenous species of fish, including *Boleophthalmus pectinirostris*, *Odontamblyops rubicundus*, *Periophthalmus cantonensis*, *Coilia mystus*, *Acanthogobius hasta*,

*Trachidermus fasciatus* and *Areliscus joyneri*. The very rich invertebrate fauna includes many indigenous species of shrimps and crabs.

**Special floral values:** No information.

**Research and facilities:** The avifauna has been well documented and regular waterfowl censuses have been carried out.

**References:** Environment Agency (1972-1984); Hayashi & Kawaji (1976); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2a, 2c, 3a, 3c.

**Source:** IWRB Japan Committee.

**Wetland name: Izumi**

**Country:** Japan

**Coordinates:** 32°05'N, 130°20'E;

**Location:** near Noda-Machi and Takaono-Machi, west of Izumi City, 60 km NNW of Kagoshima, Kagoshima Prefecture, Kyushu.

**Area:** 210 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 06, 08, 11, 15, 17 & 19.

**Description of site:** A large area of rice paddies, bean fields and grassland with scattered farms on reclaimed land in the estuaries of three rivers, the Takaono, Noda and Eguchi. Izumi City lies to the east, and there are hill ranges to the south. The reclaimed area is divided into an eastern and a western section by the Noda River. The eastern section at Arasaki is intensively cultivated and has several ponds surrounded by small reed-beds. A road runs along the coast to the north and along the Noda River. There are intertidal mudflats and brackish marshes in the estuaries.

**Climatic conditions:** Warm temperate climate with an average annual rainfall of 1,785 mm and a mean annual temperature of 16.7°C. The winters are mild (mean temperature from November to February 8.9°C) and rather dry (average rainfall 272 mm).

**Principal vegetation:** Rice fields, bean fields, grassland and some reed-beds.

**Land tenure:** Izumi City owns 1.5 ha of land; the remainder is privately owned.

**Conservation measures taken:** The wetland is included within a Prefecture Special Wildlife Protection Area of 842 ha, created for the period November 1984 to October 1987 to protect the wintering habitat of *Grus monacha* and *G. vipio*. The area is also included within a Special Natural Monument of 245 ha. Approximately 50 ha of rice paddies are leased each winter by the Agency of Cultural Affairs to provide a secure roosting area for the cranes. Artificial feeding stations were established in 1962/63 with the support of Izumi City and Takaono and Noda Towns, and in recent years over 50,000 kg of food, mainly wheat, has been distributed each winter. It has been estimated that this represents more than half of the total consumption of the cranes (Ohsako, 1987). Some compensation has been paid to farmers for crop damage, and some soil restoration work has been carried out.

**Conservation measures proposed:** A proposal has been made for the establishment of a National Wildlife Protection Area at the site.

**Land use:** Crane-watching and agriculture (mainly cultivation of rice) at the wetland; agriculture and residential housing in surrounding areas.

**Disturbances and threats:** An increase in traffic and general human disturbance are causing problems for the cranes. The problem of crop damage by the cranes has been raised several times by the local farmers, and in 1983 the farmers demanded higher rents for the winter feeding areas.

**Economic and social values:** The wintering population of cranes attracts large numbers of visitors every year.

**Fauna:** The reclaimed land is an extremely important wintering area for the Hooded Crane *Grus monacha* and White-naped Crane *Grus vipio*, and is the most important wintering area for the former in the world. The total number of cranes wintering at the site has increased from less than a thousand in the 1950s to about 2,300 in the early 1970s, 4,775 in 1979/80, and an average of 7,100 in the six winters 1981/82 to 1986/87 (maximum 8,138 in 1983/84). The rapid increase in numbers since 1962 has been attributed to the artificial feeding. Much the most numerous species is *G. monacha* (average of 5,980 in 1981/82 to 1986/87; maximum 7,036 in 1983/84), but there are also over a thousand *G. vipio* (average of 1,120 in 1981/82 to 1986/87, maximum 1,448 in 1978/79). The cranes begin to arrive in late October and reach a peak in late December. Most of the *G. vipio* leave in the second half of February, and the *G. monacha* in early March. The Common Crane *G. grus* occurs almost annually in very small numbers (maximum eight), and *G. canadensis*, *G. japonensis*, *G. leucogeranus* and *Anthropoides virgo* have been recorded as vagrants. Ornithologists are concerned that the population of cranes now exceeds the optimum level for the area, and are considering ways of encouraging some of the birds to move elsewhere. The reclaimed land and tidal mudflats are also important for other migratory waterfowl, particularly shorebirds, and several rare or unusual species have been observed such as *Threskiornis melanocephalus*, *Platalea minor*, *Tadorna ferruginea* and *Calidris minuta*.

**Special floral values:** No information.

**Research and facilities:** Numerous studies have been carried out on the cranes, and there have been regular censuses since the 1920s. In recent years, the annual counts have been carried out by the Izumi Board of Education and the Wild Bird Society of Japan. A Bird Banding Station has been established at Izumi by the Environment Agency, and over 120 cranes were banded between 1979 and 1987.

**References:** Kagoshima Board of Education (1978); Kanouichi & Morioka (1976); Karpowicz (1985); Koga (1981); Nishida (1981); Ohsako (1987); Ozaki (1987); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 2a, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Manko Tidal Mudflat

**Country:** Japan

**Coordinates:** 26°13'N, 127°41'E;

**Location:** near Tomishiro Village, west of Naha City, near the southwestern tip of Okinawa Island, Okinawa Prefecture, Ryukyu Islands.

**Area:** 50 ha (including 40 ha of intertidal mudflats).

**Altitude:** Sea level.

**Biogeographical Province:** 2.41.13.

**Wetland type:** 02 & 06.

**Description of site:** An area of estuarine intertidal mudflats, about 1 km upstream from the coast, at the confluence of two rivers which flow through an urban area. The mudflat is surrounded by a concrete bank with a road on top, except in the south where a public garden adjoins the mudflat and some vegetation remains along the river bank. The maximum tidal variation is 2m, and only a narrow river channel remains at low tide.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,203 mm and a mean annual temperature of 22.1°C.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** The wetland was included in a National Wildlife Protection Area of 250 ha established for a ten year period from November 1987 to October 1997.

**Land use:** None at the wetland; residential areas, a public garden and the ruins of a castle in surrounding areas.

**Possible changes in land use:** There is a proposal to construct a road by-pass and bridge through the wetland.

**Disturbances and threats:** Road construction would affect some of the wetland habitat and cause a considerable amount of disturbance.

**Economic and social values:** No information.

**Fauna:** Located on Okinawa Island in the Ryukyu chain, Manko Mudflat is of great importance as a staging and wintering area for migratory waterfowl, particularly shorebirds. During the 1986 annual mid-winter count, 17 species of shorebirds were recorded including:

331 *Pluvialis dominica*

93 *P. squatarola*

123 *Charadrius alexandrinus*

191 *C. mongolus*

47 *Numenius arquata*

48 *Tringa nebularia*

502 *Calidris ruficollis*

810 *C. alpina*

Many more shorebirds occur during the peak of the migration seasons. Other waterfowl recorded during the 1986 mid-winter count included:

21 *Egretta alba*

55 *Ardea cinerea*

2 *Ciconia (ciconia) boyciana*

253 *Anas crecca*

46 *Larus ridibundus*

and smaller numbers of three other *Anas* species, and seven *Larus saundersi* and *Chlidonias hybrida*. A variety of rare or unusual species have been recorded such as *Ardea purpurea*, *Platalea leucorodia*, *P. minor* and *Recurvirostra avosetta*.

**Special floral values:** No information.

**Research and facilities:** The avifauna has been well documented, and several waterfowl censuses have been carried out.

**References:** Environment Agency (1972-1984); Wild Bird Society of Japan (1982-85, 1982-86 & 1984); Yonashiro (1974).

**Criteria for inclusion:** lb. 2a, 2c, 3b.

**Source:** IWRB Japan Committee.

**Wetland name:** Ampal Estuary and Mangroves

**Country:** Japan

**Coordinates:** 24°23'N, 124°9'E;

**Location:** near Nagura, northwest of Ishigaki City, on the west coast of Ishigaki Island, Okinawa Prefecture, Ryukyu Islands.

**Area:** c.250 ha.

**Altitude:** 0-10m.

**Biogeographical Province:** 2.4 1.13.

**Wetland type:** 02, 06 & 07.

**Description of site:** A small estuarine system with mangrove forests, intertidal mudflats and associated brackish marshes on the west coast of Ishigaki Island, near the western end of the Ryukyu archipelago. There is a narrow strip of alluvial land at the mouth of the estuary, and there are two road bridges over the river. There are fern marshes along the river, and rice paddies behind the mangrove forest. The maximum tidal variation is about two metres.

**Climatic conditions:** Humid subtropical climate with an average annual rainfall of 2,195 mm, a mean annual temperature of 23.6°C, and an average minimum temperature of 5.9°C.

**Principal vegetation:** Mangrove forest with *Bruguiera conjugata* and *Rhizophora mucronata*.

**Land tenure:** Mainly state owned.

**Conservation measures taken:** The wetland is included within a Prefecture Wildlife Protection Area of 1,058 ha, established as a reserve for migratory birds for a ten-year period from November 1985 to November 1995.

**Land use:** Gathering of shells at low tide (for recreation); cultivation of rice and other agriculture in surrounding areas.

**Disturbances and threats:** Construction of drainage ditches. Economic and social values: No information.

**Fauna:** Situated on a small offshore island on a major migratory route, the wetland provides an extremely important staging area for a wide variety of migratory waterfowl such as herons, ibises, rails and shorebirds. It is also a wintering area for *Bubulcus ibis*, *Egretta garzetta* and several species of shorebirds, notably *Numenius phaeopus* and *Tringa totanus*. Large numbers of wagtails, mainly *Motacilla flava*, use the mangroves for roosting. Resident species include *Ixobrychus cinnamomeus*, *Amaurornis phoenicurus* and *Gallicrex cinerea*. Many rare or unusual species have been observed including *Botaurus stellaris*, *Ardea purpurea*, *Ciconia (ciconia) boyciana*, *Threskiornis melanocephalus* and *Halcyon chloris*. The rich invertebrate fauna includes numerous fiddler crabs *Uca lactea lactea*, *U. vacans vacans* and *U. chlorophthalma crassipes*.

**Special floral values:** One of the largest stands of mangrove forest in Japan.

**Research and facilities:** Regular waterfowl censuses have been carried out, and the avifauna has been well documented.

**References:** Shimabukuro (1980); Wild Bird Society of Japan (1982-85, 1982-86 & 1984).

**Criteria for inclusion:** 1b, 2b, 2c, 3b.

**Source:** IWRB Japan Committee.

**Wetland name: Sarufutsu Marsh and Poronuma Pond**

**Country:** Japan

**Coordinates:** 45°16'N, 142°12'E;

**Location:** Sarufutsu-mura, Soya-gun, 40 km ESE of Wakkana, Hokkaido.

**Area:** 190 ha.

**Altitude:** Less than 5m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 14.

**Description of site:** A small freshwater lake and associated marshes on the coastal plain near the northern tip of Hokkaido.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (190 ha) from March 1988 to 1998.

**Fauna:** A very important breeding and staging area for migratory waterfowl.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Komuke

**Country:** Japan

**Coordinates:** 44°16'N, 143°29'E;

**Location:** 15 km southeast of Monbetsu City, Hokkaido.

**Area:** c.1, 400 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 08.

**Description of site:** A coastal lagoon and marshes on the north coast of Hokkaido.

**Conservation measures taken:** None.

**Fauna:** A very important breeding and staging area for migratory waterfowl.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Tofutsu

**Country:** Japan

**Coordinates:** 43°56'N, 144°25'E;

**Location:** Abashiri City and Koshimizu-cho, Shari-gun, 105 km north of Kushiro, Hokkaido.

**Area:** 2,051 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 14.

**Description of site:** A freshwater lake of 900 ha and associated marshes on the coastal plain of northeastern Hokkaido. A main highway and railroad pass close to the lake on the seaward side. The lake freezes over in winter.

**Conservation measures taken:** First designated as a Wildlife Protection Area in 1963. A Prefecture Wildlife Protection Area of 2,051 ha was established in October 1982 for twenty years; this includes a Special Reserve of 900 ha established in March 1983 and also in force until 2002.

**Fauna:** A very important staging area for migratory waterfowl, particularly swans, and a breeding area for many species. Up to 4,000 *Cygnus cygnus* and a small number of *C. columbianus* stop over at the lake from late October to mid December and again in April. In recent years, some 40-100 *C. cygnus* have overwintered along nearby rivers and streams with open water. One pair of *Grus japonensis* occurs in the marshes.

**Research and facilities:** Some research has been carried out on the swans.

**References:** Tamada (1981).

**Source:** IWRB Japan Committee.

**Wetland name:** Notsuke Peninsula and Odaito Bay

**Country:** Japan

**Coordinates:** 43°35'N, 145°18'E;

**Location:** Bekkai-cho, Notsuke-gun, 95 km northeast of Kushiro, Hokkaido.

**Area:** c.8, 500 ha.

**Altitude:** 0-5m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 01, 03, 05, 06 & 08.

**Description of site:** A shallow sea bay with associated coastal marshes and several low-lying islands, almost enclosed by a crescent-shaped sandy peninsula; on the east coast of Hokkaido.

**Conservation measures taken:** None.

**Fauna:** A very important breeding area for *Grus japonensis* (5 pairs) and *Tringa totanus*, and a wintering area for *Cygnus cygnus* and auks (Alcidae).

**Source:** IWRB Japan Committee.



**Wetland name:** Kiritappu Marsh

**Country:** Japan

**Coordinates:** 43°05'N, 145°06'E;

**Location:** Hamanaka-cho, Akkeshi-gun, 55 km east of Kushiro, Hokkaido.

**Area:** Several hundred ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 01, 03 & 08.

**Description of site:** An area of coastal marshes around a shallow sea bay with several low-lying offshore islands.

**Conservation measures taken:** A temporary Shooting Preserve.

**Fauna:** A very important breeding area for *Grus japonensis* and a staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Yudo and Chobushi Lakes

**Country:** Japan

**Coordinates:** 42°38'N, 143°34'E;

**Location:** Toyokoro-cho, Nakagawa-gun, 80 km southwest of Kushiro, Hokkaido.

**Area:** 4,122 ha (Yudo 3,855 ha, Chobushi 267 ha).

**Altitude:** 0-5m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 14.

**Description of site:** A group of small freshwater lakes and associated marshes on the southeast coast of Hokkaido.

**Conservation measures taken:** Prefecture Wildlife Protection Areas have been established at Yudo (3,855 ha) from October 1972 to 1992, and at Chobushi (267 ha) from October 1986 to September 2006.

**Fauna:** A very important staging area for migratory waterfowl, and a breeding area for *Grus japonensis* (3 pairs).

**Source:** IWRB Japan Committee.

**Wetland name:** Hachirogata Reclamation Area

**Country:** Japan

**Coordinates:** 40°00'N, 140°00'E;

**Location:** Ogata-mura, Minamiakita-gun, 35 km NNW of Akita, Akita Prefecture, Honshu.

**Area:** 135 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 15 & 20.

**Description of site:** A small area of freshwater marshes in a large area of wet farmland with numerous drainage ditches and canals, formed as a result of the reclamation of Hachirogata Lake (17,229 ha) in the early 1960s. Extensive areas of marshes appeared as the lake was being drained, but these have since been converted to agricultural land.

**Principal vegetation:** Marshes with *Phragmites communis*, *Mischanthus sinensis*,

Imperatocylindrica and Scirpus triqueter; agricultural land, mainly rice paddies, in surrounding areas.  
**Conservation measures taken:** A National Wildlife Protection Area of 135 ha, including a Special Reserve of 48 ha, was established in March 1977 and will be in force until 1996.  
**Fauna:** An important breeding area for the very local Japanese Marsh Warbler *Megalurus pryeri* (53 singing birds in 1973), and a very important staging and wintering area for geese. During the mid-1970s, up to 4,000 *Anser albifrons* and 1,000 *A. fabalis* visited the area on migration, and *Branta canadensis* has been recorded.  
**Research and facilities:** Regular waterfowl censuses have been carried out, and some studies were made on the *Megalurus pryeri* population in the mid 1970s.  
**References:** Nishide (1975); Stoutjesdijk (1982); Yokota et al. (1976).  
**Source:** IWRB Japan Committee.

**Wetland name:** Omono River at Jumonji-cho

**Country:** Japan

**Coordinates:** 39°10'N, 140°32'E;

**Location:** Jumonji-cho, Hiraka-gun, 65 km southeast of Akita, Akita Prefecture, Honshu.

**Area:** 151 ha.

**Altitude:** 65m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 13.

**Description of site:** Riverine marshes and meadows along the middle reaches of the Omono River in north-central Honshu. **Conservation measures taken:** A Prefecture Wildlife Protection Area (151 ha) from November 1982 to October 1992.

**Fauna:** A very important staging area for migratory swans and ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Mogami River

**Country:** Japan

**Coordinates:** 38°53'N, 139°52'E;

**Location:** south of Sakata City, 90 km SSW of Akita, Yamagata Prefecture, Honshu.

**Area:** 1,732ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 02, 05, 06 & 08.

**Description of site:** The estuarine marshes of the Mogami River, a small river rising in the highlands of northern Honshu. Sandy beaches along the adjacent coast.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (1,732 ha) from November 1983 to October 1993.

**Fauna:** A very important staging area for migratory swans and ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Keshounuma Pond

**Country:** Japan

**Coordinates:** 38°38'N, 140°58'E;

**Location:** north of Furukawa City, 45 km north of Sendai, Miyagi Prefecture, Honshu.

**Area:** 351 ha.

**Altitude:** c.70m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** A small freshwater lake and associated marshes on the plain of the Kitakami valley, 15 km southwest of Lake Izunuma (site 7).

**Conservation measures taken:** A Prefecture Wildlife Protection Area (351 ha) from November 1980 to October 1990.

**Fauna:** A very important wintering area for waterfowl which also use the nearby Lake Izunuma.

**Source:** IWRB Japan Committee.

**Wetland name:** Gamo Beach

**Country:** Japan

**Coordinates:** 38°15'N, 141°01'E;

**Location:** east of Gamo-Sendai City, Miyagi Prefecture, Honshu.

**Area:** 7,790 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 01 & 08.

**Description of site:** An area of coastal marshes and the shallow inshore waters of Sendai Bay, near the city of Gamo-Sendai.

**Conservation measures taken:** A National Wildlife Protection Area (7,790 ha).

**Fauna:** A very important staging area for migratory shorebirds and a wintering area for *Branta bernicla*.

**Source:** IWRB Japan Committee.

**Wetland name:** Torinoumi Lagoon

**Country:** Japan

**Coordinates:** 38°02'N, 140°55'E;

**Location:** Watari-cho, Watari-gun, 20 km south of Sendai City, Miyagi Prefecture, Honshu.

**Area:** 180 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 02 & 08.

**Description of site:** A small estuarine system with associated marshes on the southwest shore of Sendai Bay.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (180 ha) from November 1986 to October 2006.

**Fauna:** A very important staging area for migratory shorebirds. **Source:** IWRB Japan Committee.

**Wetland name:** Abukuma River in Fukushima City

**Country:** Japan

**Coordinates:** 37°46'N, 140°30'E;

**Location:** in Fukushima City, 65 km southwest of Sendai, Fukushima Prefecture, Honshu.

**Area:** 768 ha.

**Altitude:** c.270m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 13.

**Description of site:** The riverine marshes of the Abukuma River c.60 km upstream from the river mouth.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (768 ha) from November 1970 to October 1990.

**Fauna:** A very important wintering area for swans and ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Inawashiro

**Country:** Japan

**Coordinates:** 37°30'N, 140°05'E;

**Location:** Aizu-Wakamatsu and Koriyama Cities, 25 km WNW of Koriyama, Fukushima Prefecture, Honshu.

**Area:** 10,933 ha.

**Altitude:** 514m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** A large freshwater lake and associated marshes on a plateau in the hills of north-central Honshu; fed by local run-off and overflow from the Urabandai Lakes (site 81) to the north. The lake is a caldera lake, formed during volcanic activity about one million years ago. There is a rich growth of aquatic plants along the north shore (13 km), and sandy and pebble shores around most of the rest of the lake. The lake drains west into the Agano-Gawa River.

**Conservation measures taken:** The Lake Inawashiro Wild Swan Conservation Association was founded in 1965 to protect the wintering swans, and artificial feeding stations have been established. A Prefecture Wildlife Protection Area of 10,933 ha was established in October 1984 and will be in force until 2004.

**Fauna:** A very important wintering area for swans and ducks. 400,680 *Cygnus columbianus* and up to 33 *Cygnus cygnus* overwintered on the lake in the mid 1970s.

**Research and facilities:** Detailed studies have been carried out on the wintering swans.

**References:** Ohmori (1981).

**Source:** IWRB Japan Committee.

**Wetland name:** Kujukuri Bay

**Country:** Japan

**Coordinates:** 35°20'N, 140°23'E to 35°40'N, 140°30'E;

**Location:** Ichinomiya-cho to Asahi City, Chiba Prefecture, 60 km east of Tokyo, Honshu.

**Area:** c.50 km of coastline; area of wetlands unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 02 & 08.

**Description of site:** About 50 km of the shoreline of a large sea bay, with several small estuarine systems, associated coastal marshes, and adjacent agricultural land.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 184 ha was established in the southern part in November 1979 and will be in force until October 1989.

**Fauna:** A very important staging area for migratory shorebirds and an important wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Watarase Marshes

**Country:** Japan

**Coordinates:** 36°14'N, 139°41'E;

**Location:** Fujioka-cho, Shimotsuga-gun, Tochigi Prefecture, 60 km north of Tokyo, Honshu.

**Area:** Several hundred ha.

**Altitude:** c.15m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A group of small freshwater lakes and ponds with associated marshes on the densely populated plains, north of Tokyo.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds, and an important wintering area for ducks except during the hunting season.

**Source:** IWRB Japan Committee.

**Wetland name:** Yamada and Nishida Ponds

**Country:** Japan

**Coordinates:** 36°05'N, 139°23'E;

**Location:** Namegawa-cho, Hiki-gun, Saitama Prefecture, 60 km northwest of Tokyo, Honshu.

**Area:** 802 ha.

**Altitude:** 20m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 15.

**Description of site:** An area of freshwater ponds and marshes in a forest park on the densely populated plains northwest of Tokyo.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (802 ha) from November 1979 to October 1989.

**Fauna:** A very important wintering area for ducks. **Source:** IWRB Japan Committee.

**Wetland name:** Shinobazu Pon

**Country:** Japan

**Coordinates:** 35°42'N, 139°47'E;

**Location:** Taito-ku, Tokyo Metropolitan Area, Honshu.

**Area:** 55 ha (including 16 ha of open water).

**Altitude:** c.15m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 17.

**Description of site:** A small artificial lake with extensive lotus beds and associated marshes in a park in the northern part of central Tokyo City, adjacent to Ueno Water Park.

**Conservation measures taken:** Prefecture Wildlife Protection Area (55 ha) from March 1986 to 2006.

**Fauna:** A very important wintering area for ducks, including several thousand *Aythya fuligula* and large numbers of *Anas penelope*, *A. acuta* and *Aythya ferina*. Several rare Anatidae have been recorded including *Anas americana*, *Aythya collaris* and *A. baeri*. Large numbers of *Phalacrocorax carbo* are resident in the area, and breed at a colony in Ueno Water Park. Other common winter visitors include *Tachybaptus ruficollis* and *Egretta alba*.

**References:** Brazil (1984).

**Source:** IWRB Japan Committee.

**Wetland name:** Fukushima-gata, Toyano-gata, Sagata and Lake Hyoko

**Country:** Japan

**Coordinates:** 37°49'-37°54'N, 138°53'-139°15'E;

**Location:** near Niigata City, Niigata Prefecture, Honshu.

**Area:** 988 ha (Fukushimagata 163 ha, Toyanogata 264 ha, Sagata and Mitaragata 251 ha, Lake Hyoko 390 ha).

**Altitude:** 0-5m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14 & 15.

**Description of site:** Several small freshwater lakes and ponds and their associated marshes in the combined delta area of the Shinano-Gawa, Agano-Gawa and several smaller rivers, near Niigata City. The wetlands include: Fukushimagata and Toyanogata lakes and marshes (37°54'N, 13915'E; 427 ha), 15 km east of Niigata; Sagata and Mitaragata lakes and marshes (37°49'N, 138°53'E; 251 ha), 15 km southwest of Niigata; and Lake Hyoko (37°50'N, 13915'E, 310 ha), 15 km southeast of Niigata. In a densely populated area of cultivated plains.

Conservation measures taken: Four wildlife protection areas have been established: the Fukushimagata National Wildlife Protection Area (163 ha) effective from November 1984 to October 1994; the Toyanogata Prefecture Wildlife Protection Area (264 ha) effective from October 1983 to November 1993; the Sagata and Mitaragata National Wildlife Protection Area (251 ha) effective from March 1983 to October 1990; and the Lake Hyoko Prefecture Wildlife Protection Area (310 ha) effective from October 1979 to November 1989. Artificial feeding stations have been established for the swans at Lake Hyoko.

**Fauna:** A very important wintering area for waterfowl, particularly ducks and swans. Several hundred *Cygnus cygnus* spend the winter at Lake Hyoko, and several hundred *Anser fahalis* winter at Fukushimagata.

**Research and facilities:** There is a Bird Banding Station at Fukushimagata, administered by the Environment Agency.

**References:** Kakizawa (1981); Karpowicz (1985).

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Kamo

**Country:** Japan

**Coordinates:** 38°04'N, 138°27'E;

**Location:** south of Ryotsu City, Sado Island, Niigata Prefecture.

**Area:** 486 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** A freshwater lake and associated marshes at the northern end of the central plain of Sado Island.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (486 ha) from November 1988 to 1998. **Fauna:** A very important wintering area for ducks. **Source:** IWRB Japan Committee.

**Wetland name:** Nanao Bay

**Country:** Japan

**Coordinates:** 37°05'N, 137°01'E;

**Location:** Kashima-gun, 40 km north of Takaoka, Ishikawa Prefecture, Honshu.

**Area:** Area of bay c.17,500 ha; area of wetlands unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01 & 08.

**Description of site:** A large shallow sea bay with associated coastal marshes on the east side of the Nanao Peninsula.

**Conservation measures taken:** A small part of the area is protected in a Prefecture Wildlife Protection Area of 170 ha, established in November 1983 and in force until October 1998.

**Fauna:** A very important wintering area for a wide variety of waterfowl including *Cygnus columbianus* and *Branta canadensis*, a rare visitor to Japan.

**Source:** IWRB Japan Committee.

**Wetland name:** Takamatsu Beach

**Country:** Japan

**Coordinates:** 36°46'N, 136°42'E;

**Location:** Takamatsu-cho, Ishikawa Prefecture, 25 km west of Takaoka, Honshu.

**Area:** 585 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02, 06 & 08.

**Description of site:** A small estuarine system and area of coastal marshes and intertidal mudflats north of the town of Takamatsu.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 585 ha including a 10 ha Special Reserve, established in November 1986 and in force until October 1996.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Kitakata

**Country:** Japan

**Coordinates:** 36°16'N, 136°14'E;

**Location:** Awara-cho, 20 km north of Fukui, Fukui Prefecture, Honshu.

**Area:** 230 ha.

**Altitude:** Less than 5m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A small freshwater lake and associated marshes on the northern coastal plain of central Honshu.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (230 ha) from November 1980 to October 1990.

**Fauna:** A very important wintering area for ducks including *Anas formosa*, *Aythya fuligula* and *Mergus albellus*.

**Source:** IWRB Japan Committee.

**Wetland name:** The Mikata Lakes

**Country:** Japan

**Coordinates:** 35°36'N, 135°54'E;

**Location:** Mikata-cho, 20 km WSW of Tsuruga, Fukui Prefecture, Honshu.

**Area:** 1,049 ha.

**Altitude:** c.10m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A group of small freshwater lakes and associated marshes set amidst hills on the rugged north coast of central Honshu.

**Conservation measures taken:** Two Prefecture Wildlife Protection Areas have been established, Kanko (305 ha, including a Special Reserve of 290 ha) from November 1985 to October 2005, and Mikatasuigetsu (744 ha) from November 1985 to October 1995.

**Fauna:** A very important wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Tenryu River

**Country:** Japan

**Coordinates:** 34°48'N, 137°48'E;

**Location:** Ryuyo-cho, east of Hamamatsu City, Shizuoka Prefecture, Honshu.

**Area:** Unknown.

**Altitude:** 0-5m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02, 13 & 15.

**Description of site:** The estuarine and delta system of the Tenryu River on the south coast of Honshu, with numerous river channels and canals, marshy areas and wet arable land.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 3,219 ha was established in November 1980 and will be in force until October 1990.

**Fauna:** A very important staging area for migratory shorebirds and wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Kushida River

**Country:** Japan

**Coordinates:** 34°36'N, 136°33'E;

**Location:** north of Matsuzaka City, 65 km SSW of Nagoya, Mie Prefecture, Honshu.

**Area:** Several hundred ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 01, 02 & 08.

**Description of site:** The estuarine system of the Kushida River, its associated marshes and the adjacent shallow sea bay.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Ogura Reclamation Area

**Country:** Japan

**Coordinates:** 34°54'N, 135°46'E;

**Location:** at Uji City, 10 km south of Kyoto city, Kyoto Prefecture, Honshu.

**Area:** Unknown.

**Altitude:** 20m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 15 & 20.

**Description of site:** An area of wet farmland with numerous drainage ditches and some freshwater marshes, formed by the drainage of a small lake.

**Conservation measures taken:** Shooting is prohibited.

**Fauna:** A very important inland staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Zugaike Pond

**Country:** Japan

**Coordinates:** 34°47'N, 135°24'E;

**Location:** at Itami City, Hyogo Prefecture, north of Kobe-Osaka, Honshu.

**Area:** Unknown.

**Altitude:** Less than 50m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** A small freshwater lake with associated marshes on the northern edge of the Kobe-Osaka urban area.

**Conservation measures taken:** None.

**Fauna:** A very important wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Kinkai Marshes

**Country:** Japan

**Coordinates:** 34°38'N, 134°10'E;

**Location:** at Ushimado City, Oku-gun, Okayama Prefecture, 25 km east of Okayama, Honshu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 06 & 08.

**Description of site:** An area of coastal marshes and tidal mudflats on the north shore of the Seto-Naikai Straits.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Kojima and Abe Pond

**Country:** Japan

**Coordinates:** 34°34'N, 133°56'E;

**Location:** 10 km south of Okayama City, Okayama Prefecture, Honshu.

**Area:** 1,000 ha.

**Altitude:** 0.5-0.8m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 15 & 17.

**Description of site:** A man-made lake formed by the damming of small estuaries and Kojima Bay in the early 1960s, and a small freshwater pond and associated marshes. The lake is eutrophic, with an average depth of 1.63m and maximum depth of 8m.

**Climatic conditions:** Temperate climate with an average annual rainfall of about 1,900 mm, and a mean annual temperature of about 15°C.

**Conservation measures taken:** A Prefecture Wildlife Protection Area of 1,000 ha was established in November 1982 and will be in force until October 1992.

**Land use:** Fishing, water supply for irrigation, and public recreation; cultivation of rice in surrounding areas.

**Disturbances and threats:** Eutrophication and water pollution in the lake as a result of inflow of sewage and industrial waste.

**Economic and social values:** The lake supports a small fishery and provides opportunities for outdoor recreation.

**Fauna:** A very important wintering area for ducks.

**Research and facilities:** A considerable amount of limnological research has been conducted at the lake, especially in relation to the changes in salinity and productivity following the initial damming of Kojima Bay.

**References:** Luther & Rzoska (1971).

**Source:** IWRB Japan Committee.

**Wetland name:** Yashiro Rice Fields

**Country:** Japan

**Coordinates:** 34°01'N, 131°54'E;

**Location:** 10km ESE of Tokuyama City, Yamaguchi Prefecture, Honshu.

**Area:** Several hundred ha.

**Altitude:** 300m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 19.

**Description of site:** An area of terraced paddy fields crisscrossed by streams in a network of long narrow valleys in the Yashiro Basin, in wooded hills near the Seto Naikai Straits at the western tip of Honshu.

**Conservation measures taken:** A small Wildlife Protection Area has been established at Kumage town, areas of rice paddy have been purchased and are used as artificial feeding places, an observation tower has been constructed, and roosting areas have been purchased and are managed for the cranes. The Hooded Cranes themselves have been designated as a Natural Monument.

**Conservation measures proposed:** A proposal has been made to enlarge the conservation area and improve conditions for the cranes through active management.

**Disturbances and threats:** The loss of rice paddies to forestry, the use of modern farm machinery and improved drainage have reduced the suitability of the area for cranes. Economic and social values: The cranes attract large numbers of visitors every year. Fauna: A very important wintering area for the Hooded Crane *Grus monacha*, the birds arriving in late October and leaving again in early March. From only ten birds in 1870, the wintering population gradually increased to a peak of 355 in 1940. Since then, the numbers have declined to about 60 in the mid 1980s (ten year averages: 144 in the 1950s, 104 in the 1960s, and 101 in the 1970s).

**Research and facilities:** The cranes have been studied in great detail for the past forty years, and N. Kawamura has been conducting research on their territorial and flocking behaviour since 1960.

**References:** Kawamura (1981, 1987a & 1987b); Nishida (1981).

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Saba River

**Country:** Japan

**Coordinates:** 34°02'N, 131°29'E;

**Location:** south of Houfu City, 50 km east of Shimonoseki, Yamaguchi Prefecture, Honshu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.15.5. **Wetland type:** 01, 06 & 08.

**Description of site:** A small sea bay with intertidal mudflats and associated marshes, on the north shore of the Seto-Naikai Straits.

**Conservation measures taken:** Shooting is prohibited.

**Fauna:** A very important staging area for migratory shorebirds and a wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Atsusa River

**Country:** Japan

**Coordinates:** 33°57'N, 131°13'E;

**Location:** Sanyo-cho, Onoda and Atsusa-gun, 25 km east of Shimonoseki, Yamaguchi Prefecture, Honshu.

**Area:** Unknown.

**Altitude:** Sealevel.

**Biogeographical Province:** 2.15.5.

**Wetland types :** 01, 02, 06 & 08.

**Description of site:** The estuarine system of the Atsusa River and adjacent sea bay, on the north shore of the Seto-Naikai Straits.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds and wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Chidori-hama Marshes

**Country:** Japan

**Coordinates:** 34 02'N, 131°01'E;

**Location:** 10 km northeast of Shimonoseki City, Yamaguchi Prefecture, at the extreme western tip of Honshu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 06 & 08.

**Description of site:** An area of coastal marshes and adjacent intertidal mudflats.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds, and a very important wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Kamo River

**Country:** Japan

**Coordinates:** 33°56'N, 133°09'E;

**Location:** west of Saijo City, Ehime Prefecture, on the north coast of Shikoku.

**Area:** 56 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02 & 06.

**Description of site:** The small estuarine system of the Kamo River and associated intertidal mudflats, on the south shore of the Seto-Naikai Straits.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (56 ha) from November 1982 to October 1992.

**Fauna:** A very important staging area for migratory shorebirds, and a wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Kurose Reservoir

**Country:** Japan

**Coordinates:** 33°52'N, 133°09'E;

**Location:** 10 km southwest of Saijo City, Ehime Prefecture, Shikoku.

**Area:** 390 ha.

**Altitude:** Unknown.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 17.

**Description of site:** A small freshwater reservoir with associated marshes in the hills of northern Shikoku. **Conservation measures taken:** A Prefecture Wildlife Protection Area of 390 ha, including a Special Reserve of 150 ha, was established in November 1983 and will be in force until October 1993.

**Fauna:** A very important wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Sukumo Bay

**Country:** Japan

**Coordinates:** 32°54'N, 132°43'E;

**Location:** east of Sukumo City, Kochi Prefecture, at the southwestern tip of Shikoku.

**Area:** 1,552 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 06 & 08.

**Description of site:** A large sea bay with intertidal mudflats and associated marshes.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (1,552 ha) from November 1984 to October 1994.

**Fauna:** A very important staging area for migratory shorebirds, and a very important wintering area for ducks. **Source:** IWRB Japan Committee.

**Wetland name:** Sone Bay

**Country:** Japan

**Coordinates:** 33°49'N, 130°58'E;

**Location:** Kokuraminami-ku, 10 km southeast of Kitakyushu City, Fukuoka Prefecture, Kyushu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01, 02 & 06.

**Description of site:** A small sea bay and estuarine system on the northeast coast of Kyushu.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee

**Wetland name:** Jimi River

**Country:** Japan

**Coordinates:** 33°36'N, 131°14'E;

**Location:** at Nakatsu City, 40 km southeast of Kitakyushu City, Oita Prefecture, Kyushu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02 & 06.

**Description of site:** A small estuarine system with associated intertidal mudflats on the north shore of Kyushu.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Lake Ezu

**Country:** Japan

**Coordinates:** 32°46'N, 130°45'E;

**Location:** at Kumamoto City, Kumamoto Prefecture, Kyushu.

**Area:** Unknown.

**Altitude:** c.40m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A small freshwater lake with associated marshes on the outskirts of Kumamoto City. **Conservation measures taken:** None.

**Fauna:** A very important wintering area for ducks. **Source:** IWRB Japan Committee.

**Wetland name:** Yatsushiro Bay

**Country:** Japan

**Coordinates:** 32°35'N, 130°35'E;

**Location:** Yatsushiro City, 25 km southwest of Kumamoto City, Kumamoto Prefecture, Kyushu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 01 & 06.

**Description of site:** A large shallow sea bay with extensive intertidal mudflats on the west coast of Kyushu.

**Conservation measures taken:** None.

**Fauna:** A very important staging and wintering area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Ichinose River

**Country:** Japan

**Coordinates:** 32°02'N, 131°30'E;

**Location:** Shintomi-cho, 18 km NNE of Miyazaki City, Miyazaki Prefecture, Kyushu.

**Area:** 350 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02 & 06.

**Description of site:** A small estuarine system with associated intertidal mudflats on the east coast of Kyushu.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (350 ha) from March 1982 to 1992.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Miike Pond

**Country:** Japan

**Coordinates:** 31°57'N, 130°51'E;

**Location:** near Ebino City, Miyazaki Prefecture, and south-central Kyushu.

**Area:** Unknown.

**Altitude:** Unknown.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A small freshwater lake and associated marshes.

**Conservation measures taken:** Protected within a National Wildlife Protection Area of 12,123 ha established in November 1978 and in force until October 1989; the Protection Area includes a Special Reserve of 1,927 ha.

**Fauna:** A very important wintering area for ducks.

**Source:** IWRB Japan Committee.

**Wetland name:** Estuary of the Manose River

**Country:** Japan

**Location:** 31°27'N, 130°18'E; Kaseda City, 30 km southwest of Kagoshima, Kagoshima Prefecture, Kyushu.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 02.

**Description of site:** The small estuarine system of the Manose River on the southwest coast of Kyushu. **Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Oura Reclamation Area

**Country:** Japan

**Coordinates:** 31°24'N, 130°13'E;

**Location:** Oura-cho, Kawabe-gun, 40 km southwest of Kagoshima, Kagoshima Prefecture, Kyushu.

**Area:** 275 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 20.

**Description of site:** An area of wet farmland reclaimed from a shallow sea bay in 1972.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Ose Mudflats

**Country:** Japan

**Coordinates:** 28°26'N, 129°43'E;

**Location:** at Kasari-cho, Amami-Oshima Island, Kagoshima Prefecture, Ryukyu Islands.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.4 1.13.

**Wetland type:** 06.

**Description of site:** A small area of intertidal mudflats at the east end of Amami-Oshima Island.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds.

**Source:** IWRB Japan Committee.

**Wetland name:** Kijoka Rush Fields

**Country:** Japan

**Coordinates:** 26°42'N, 128°09'E;

**Location:** at Ogimi-mura, Kunigami-gun, Okinawa Island, Okinawa Prefecture, Ryukyu Islands.

**Area:** Unknown.

**Altitude:** Sea level.

**Biogeographical Province:** 2.4 1.13.

**Wetland type:** 08.

**Description of site:** An area of rushes on the northwestern shore of Okinawa Island.

**Conservation measures taken:** None.

**Fauna:** A very important staging area for migratory shorebirds and egrets.

**Source:** IWRB Japan Committee.

**Wetland name:** Shioya Mudflats

**Country:** Japan

**Coordinates:** 26°40'N, 128°06'E;

**Location:** southeast of Ogimi-mura, Kunigami-gun, Okinawa Island, Okinawa Prefecture, Ryukyu Islands. **Area:** 250 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.41.13.

**Wetland type:** 01 & 06.

**Description of site:** A small sea bay with intertidal mudflats, on the northeastern shore of Okinawa Island.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (250 ha) from November 1984 to October 1994.

**Fauna:** A very important staging area for migratory shorebirds and egrets.

**Source:** IWRB Japan Committee.

**Wetland name:** Yonaha Bay

**Country:** Japan

**Coordinates:** 24°45'N, 125°17'E;

**Location:** south of Hirara City, Miyako Island, Okinawa Prefecture, Ryukyu Islands.

**Area:** 1,300 ha.

**Altitude:** Sea level.

**Biogeographical Province:** 2.4 1.13.

**Wetland type:** 01 & 06.

**Description of site:** An area of intertidal mudflats in a shallow sea bay with offshore coral reefs, on the west coast of Miyako Island.

**Conservation measures taken:** A Prefecture Wildlife Protection Area (1,300 ha) from March 1981 to 2001.

**Fauna:** A very important staging and wintering area for migratory shorebirds.

**Source:** IWRB Japan Committee.

## **OTHER IMPORTANT WETLANDS**

No comprehensive account of the other important wetlands in Japan has been received. The following site descriptions are taken from the Project Aqua Source Book of Inland Waters proposed for

Conservation (Luther & Rzoska, 1971), and a wetland data sheet provided by Norman Winfrid Moore. The Project Aqua report listed 19 sites in Japan. Two of these were, in fact, the same group of lakes described under different names (the Urabandai Lake Group and the Goshiki-Numa Lake Group). Of the eighteen actual sites described, two are very important for waterfowl and are included in the first section of this inventory (sites 16 and 54). Eleven of the remainder are described below. The other five sites, Suwa-Ko, Kizaki-Ko, Yoshino River, Lake Shinmiyo and Chimikeppu-Ko, are probably no longer of any real conservation importance.

**Wetland name:** Lake Chinishibetsu-Numa

**Country:** Japan

**Coordinates:** 44°02'N, 145°05'E;

**Location:** in the central mountain range of the Shiretoko Peninsula, 65 km east of Abashiri, Hokkaido.

**Area:** 25 ha.

**Altitude:** 700m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 14.

**Description of site:** A small freshwater lake formed by a natural barrier created by the nearby Tencho volcano. The lake is dystrophic and has a maximum depth of 2.1 m; a pH value of 7.2 has been recorded.

**Principal vegetation:** The phytoplankton consists chiefly of *Characium limneticum*, *Chlorobotrys limneticus*, *Gloeocystis planktonica* and *Cosmocladium constrictum*.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within the Shiretoko National Park (39,731 ha) established in 1964.

**Land use:** None.

**Disturbances and threats:** None; the lake is well protected in the National Park.

**Economic and social values:** The lake is a splendid example of an alpine lake, the natural conditions of which have not been affected by human agencies because of its remoteness; it thus offers excellent opportunities for scientific research.

**Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** Hirano (1962) has conducted a limnological study of the lake and has described the phytoplankton.

**References:** Hirano (1962); Luther & Rzoska (1971).

**Criteria for inclusion:** lb.

**Source:** See references.

**Wetland name:** Lake Mashu

**Country:** Japan

**Coordinates:** 43°35'N, 144°33'E;

**Location:** 65 km north of Kushiro, Hokkaido.

**Area:** 2,000 ha.

**Altitude:** 351m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 14.

**Description of site:** An oligotrophic caldera lake of the Mashu volcano, with an average depth of 137.5m, and a maximum depth of 212m. The water of the lake is unusually clear; in 1931, the Secchi transparency measured 41.6m, but this has since decreased somewhat.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within the Akan National Park (90,538 ha) established in 1934.

**Land use:** Fishing for introduced trout and other outdoor recreation.

**Disturbances and threats:** Stocking with exotic species of fish has interfered with the natural ecosystem of the lake; otherwise the lake is well protected in the National Park.

**Economic and social values:** A beautiful lake with high scenic values, popular for tourist recreation.

**Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of work has been done on the limnology and fish stocks of the lake.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb.

**Source:** See references.

**Wetland name:** Lake Akan

**Country:** Japan

**Coordinates:** 43°27'N, 144°06'E;

**Location:** 55 km NNW of Kushiro, Hokkaido.

**Area:** 1,180 ha.

**Altitude:** 419m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 14.

**Description of site:** An oligotrophic (somewhat mesotrophic) lake formed by a barrier created by the Akan volcanoes; the average depth is 17.8m and the maximum 36.6m.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within the Akan National Park (90,538 ha) established in 1934.

**Land use:** Fishing and other outdoor recreation.

**Disturbances and threats:** Overfishing and excessive visitation by tourists have resulted in a marked decline in the population of the endemic subspecies of trout and in the occurrence of Cladophora balls.

**Economic and social values:** A popular area for tourist recreation.

**Fauna:** The lake is the original home of a land-locked race of the trout *Oncorhynchus nerka*, which has been successfully introduced into many other oligotrophic lakes in Japan. The lake was noted for the presence of large balls of Cladophora (*Aegagrophila saWert*) in the littoral region, but these have decreased greatly in recent years.

**Special floral values:** None known.

**Research and facilities:** A considerable amount of limnological research has been carried out at the lake.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb. 2d.

**Source:** See references.

**Wetland name:** Lake Shikaribetsu

**Country:** Japan

**Coordinates:** 43°17'N, 143°08'E;

**Location:** 40 km north of Obihiro, Hokkaido.

**Area:** 344 ha.

**Altitude:** 797m.

**Biogeographical Province:** 2.14.5.

**Wetland type:** 17.

**Description of site:** A small oligotrophic lake, up to 99m deep, in the hills of central Hokkaido. The lake has been dammed to provide electricity for the Hokkaido Electric Company.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within a National Park.

**Land use:** Generation of electricity, fishing and outdoors recreation.

**Disturbances and threats:** None known.

**Economic and social values:** Outdoors recreation within a National Park.

**Fauna:** The lake has an interesting fish fauna including the charr *Salvelinus malma*.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of research has been carried out on the limnology and fish fauna of the lake.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb, 2b.

**Source:** See references.

**Wetland name:** Lake Shikotsu

**Country:** Japan

**Coordinates:** 42°45'N, 141°20'E;

**Location:** near Chitose City, 30 km south of Sapporo, Hokkaido.

**Area:** 7,720 ha.

**Altitude:** 248m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** A typical caldera lake; oligotrophic and extremely deep (363m) with its bottom below sea-level. The lake does not freeze over in winter.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within the Shikotsu-Toya National Park (98,332 ha) established in 1949.

**Land use:** Fishing and outdoor recreation; also used to generate electricity for the Oji Paper Mill.

**Disturbances and threats:** There may be some problems from excessive tourist exploitation.

**Economic and social values:** Outdoor recreation in the National Park.

**Fauna:** The trout *Oncorhynchus nerka* is abundant.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of research has been carried out on the limnology and fish fauna of the lake.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb.

**Source:** See references.

**Wetland name:** Lake Ososesan

**Country:** Japan

**Coordinates:** 41°19'N, 141°05'E;

**Location:** in Tohoku District, 60 km NNE of Aomori, Aomori Prefecture, near the northernmost tip of Honshu. **Area:** 250 ha.

**Altitude:** 214m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** An oligotrophic crater lake of the Osoresan volcano; up to 15.8m deep and remarkably acidic, with a pH value of 3.5 and an unusual milky green colour. There are many sulphureous hot springs in the northern littoral region of the lake.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** None.

**Land use:** Recreation; national forests in surrounding areas.

**Disturbances and threats:** Deforestation in the area around the lake has caused some problems.

**Economic and social values:** A sacred place for pilgrimage, and a popular area for outdoor recreation. **Fauna:** The lake has a very abundant planktonic fauna, chiefly crustaceans, and the fish *Leuciscus hakuensis* is common.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of limnological research has been carried out at the lake. **References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb.

**Source:** See references.

**Wetland name:** Lake Kata-Numa

**Country:** Japan

**Coordinates:** 38<sup>0</sup>44'N, 140°43'E;

**Location:** in Miyagi Prefecture, 55 km NNW of Sendai, Honshu.

**Area:** 10 ha.

**Altitude:** 306m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** An oligotrophic crater lake of the Narugo volcano, with an average depth of 3.0m, a maximum depth of 16.2m, and a milky yellowish green colour. The lake is possibly the most acidic lake in the world, with a pH of only 1.8.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** None.

**Land use:** Sulphur mining from the lake, and tourist recreation.

**Disturbances and threats:** There is a possibility that the sulphur mining activities are having a detrimental effect on the natural conditions of the lake.

**Economic and social values:** A popular area for outdoor recreation, and as one of the most acidic lakes in the world, a site of outstanding scientific interest.

**Fauna:** A diatom *Pinnularia braunii* var. *amphicephala* occurs in the bottom mud.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of limnological research has been carried out at the lake. **References:** Luther & Rzoska (1971).

**Criteria for inclusion:** la, 2d.

**Source:** See references.

**Wetland name:** The Urabandai Lakes

**Country:** Japan

**Coordinates:** 37° 37' -76°44'N, 140° 02'-140° 09'E;

**Location:** in Fukushima Prefecture, 40 km northwest of Koriyama, Honshu.

**Area:** c.2,000 ha.

**Altitude:** 784-1,160m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14 & 15.

**Description of site:** A group of 80 or more small lakes and ponds formed by the damming effect of landslides or on the irregular surfaces of the landslides on the lower slopes of Bandai Volcano, in the north-central highlands of Honshu. The landslides occurred as a result of an eruption of Bandai Volcano in July 1888. Much the largest lakes are Lake Hibara (1,080 ha, maximum depth 31m) and Lake Akimoto (c.350 ha, maximum depth 34.5m). Most of the other lakes are well under 50 ha in extent and less than 15m deep. All are oligotrophic and acidic, with pH values ranging from 2.8 to 6.9, and most are colourful, with waters tinged milky green, yellowish green, blue green, cobalt blue or brownish red.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** The lakes are protected within the Bandai-Asahi National Park (189,582 ha) established in 1950.

**Land use:** Outdoor recreation.

**Disturbances and threats:** None known.

**Economic and social values:** Popular for tourist recreation, and of considerable value for scientific research, particularly for studies on succession in volcanic lakes since their origin, and studies on production processes in acidotrophic lakes.

**Fauna:** The lakes support a very simple fauna characteristic of acidic lakes.

**Special floral values:** No information.

**Research and facilities:** A considerable amount of limnological research has been conducted at several of the lakes.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** 1a.

**Source:** See references.

**Wetland name:** The Oku-Nikko Lakes

**Country:** Japan

**Coordinates:** 36°45'N, 139°25'E;

**Location:** in Tochigi Prefecture, 45 km WNW of Utsunomiya, Honshu.

**Area:** c.1, 500 ha.

**Altitude:** 1,084-2,174m.

**Biogeographical Province:** 2.15.5.

**Wetland type:** 14.

**Description of site:** About ten small lakes and ponds formed by landslides on the slopes of Shirane Volcano (2,573m). Much the largest lake is Chuzenji-ko (1,163 ha),

which is 176m deep. Some of the lakes are oligotrophic, some mesotrophic and some eutrophic.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** The lakes are protected within the Nikko National Park (140,698 ha) established in 1934.

**Land use:** Fishing and outdoors recreation at the two largest lakes, Chuzenji-ko and Yuno-ko.

**Disturbances and threats:** None known.

**Economic and social values:** A popular area for tourist recreation.

**Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** There is a Fishery Station at the lakes, and a considerable amount of research has been conducted on the limnology and fish fauna.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb.

**Source:** See references.

**Wetland name:** Ikedadani Dragonfly Sanctuary

**Country:** Japan

**Coordinates:** 32°59'N, 132°55'E;

**Location:** on the western edge of Nakamura City, Kochi Prefecture, near the southern tip of Shikoku.

**Area:** c.50 ha including surrounding woodland.

**Altitude:** Unknown (less than 100m).

**Biogeographical Province:** 2.2.2.

**Wetland type:** 15 & 19.

**Description of site:** A complex of paddy fields (in use and abandoned), freshwater marshes, small streams and two man-made ponds in two connecting valleys. The wetland is fed by local run-off and has a maximum depth of 1 m.

**Climatic conditions:** Warm, humid, temperate climate.

**Principal vegetation:** The rich aquatic vegetation includes species of *Typha*, *Iris* and *Nymphaea*. The surrounding hills are covered in secondary mixed forest.

**Land tenure:** Part of the wetland is owned by Tombo No Kai (The Dragonfly Society of Japan) and the rest is owned by several private owners; surrounding areas are privately owned.

**Conservation measures taken:** The part owned by Tombo No Kai is protected and managed as a Dragonfly Sanctuary. Management to date has included the excavation of ponds in abandoned rice paddies, and reintroduction of *Libellula angelina*, one of the rarest dragonflies in Japan. A leaflet about the Sanctuary has been prepared, pathways are being constructed, and special efforts are being made to encourage visitors without causing damage to the habitat.

**Conservation measures proposed:** The Dragonfly Society hopes eventually to acquire the whole of the area. There is a plan to build a car park on the edge of the site, and a proposal has been made for the construction of an Exhibition Centre and Children's Study Area. Rice paddies in the Sanctuary will be converted into ponds and marshes for

the dragonflies, and a programme for the reintroduction of *Nannophya pygmaea* is planned.

**Land use:** Some rice-growing in a part of the area; fishing, forestry and urban development in adjacent areas.

**Possible changes in land use:** The Sanctuary includes the whole of the catchment area of the wetlands within it; this is crucial for the dragonflies, which depend on both the wetlands and the surrounding woodlands. However, urban development in adjacent areas would cause air pollution, which might affect the Sanctuary.

**Disturbances and threats:** There is excessive disturbance from visitors, despite the efforts that have been taken to prevent this.

**Economic and social values:** The wetland provides exceptional opportunities for conservation education and scientific research. The establishment of the Dragonfly Sanctuary has been supported by the City of Nakamura Government as a boost to tourism.

**Fauna:** The area is primarily important for its outstanding dragonfly fauna. 64 species have been recorded, i.e. almost one third of the total Japanese fauna. Particularly noteworthy are *Oligoaeschna pryeri*, *Aeschnophlebia longistigma*, *A. anisoptera*, *Epitheca marginata* and *Libellula angelina*, the latter recently reintroduced into the area. Other fauna includes the killi fish, a species which has now almost disappeared from Japanese paddy fields, and seven species of amphibians. Several species of herons and egrets (Ardeidae) feed in the area, and the Ruddy Crake *Porzana fusca* breeds.

**Special floral values:** The Sanctuary contains a very rich aquatic flora of a type, which is becoming increasingly rare in Japan.

**Research and facilities:** Several studies have been made on the dragonfly fauna.

**References:** Sugimura (1985).

**Criteria for inclusion:** 2a, 2b.

**Source:** Norman Winfrid Moore.

**Wetland name:** Lake Onami

**Country:** Japan

**Coordinates:** 31°55'N, 130°51'E;

**Location:** in Kagoshima Prefecture, 48 km NE of Kagoshima, Kyushu.

**Area:** 25 ha.

**Altitude:** 1,239m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A small crater lake near the summit of Onami Volcano, one of the Kirishima volcanoes in south-central Kyushu. The lake is surrounded by a steep crater wall and has a very restricted drainage basin. It is extremely oligotrophic, and has a maximum depth of 11.6m.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within the Kirishima-Yaku National Park (54,012 ha) established in 1934.

**Land use:** Tourist recreation.

**Disturbances and threats:** None known; the lake is well protected in the National Park.

**Economic and social values:** A popular area for tourist recreation, and of considerable limnological interest. **Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** Several studies have been conducted on the limnology of the lake.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** 1a.

**Source:** See references.

**Wetland name:** Lake Ikeda

**Country:** Japan

**Coordinates:** 31°14'N, 130°34'E;

**Location:** in Kagoshima Prefecture, 40 km south of Kagoshima, near the southern tip of Kyushu.

**Area:** 1,100 ha.

**Altitude:** 66m.

**Biogeographical Province:** 2.2.2.

**Wetland type:** 14.

**Description of site:** A small caldera lake, up to 233m deep, on a hilly peninsula at the southern tip of Kyushu. The lake is subtropical in character, with meromictic stratification and full circulation only during severe winters.

**Principal vegetation:** No information.

**Land tenure:** State owned.

**Conservation measures taken:** Protected within the Kirishima-Yaku National Park (54,012 ha) established in 1934.

**Land use:** Fishing and outdoors recreation.

**Disturbances and threats:** None known.

**Economic and social values:** Popular for outdoor recreation, and of considerable limnological interest. **Fauna:** No information.

**Special floral values:** No information.

**Research and facilities:** Some limnological investigations have been made at the lake.

**References:** Luther & Rzoska (1971).

**Criteria for inclusion:** lb.

**Source:** See references.

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