Chapter 15 Red Data Book and Migratory Birds

15.1 INTRODUCTION

This supplemental information is provided in order to address specific questions raised following publication of the international style Environmental Impact Assessment (EIA) in 2003 and as such forms a component of the EIA addendum (EIA-A).

A more detailed description of the Sakhalin Red Data Book (RDB) bird species recorded on the island is provided, with particular reference to migratory behaviour and the habitat types that support these species. This ornithological data is presented in order to illustrate the nature of the differing ecosystems present on the Island, the potential impact of the Sakhalin II project activities upon these different habitats and the bird assemblages that they support and the measures being taken to ensure that ecological processes and interests, with respect to these bird species, are maintained.

15.2 OVERVIEW OF STATUS OF RARE AND PROTECTED BIRD SPECIES ON SAKHALIN

The list of birds included in the Red Data Book of Sakhalin Oblast and which are present, or recorded from, Sakhalin Island (i.e. excluding the Kuril Islands) consists of 90 species. Out of these, 19 species are included in the Red Data Book – Threatened Birds of Asia and 42 species are included in the Red Data Book of the Russian Federation. A significant number of these species are also listed in the Japan-Russia Migratory Bird Treaty (1973).

The major part (about 70%) of Sakhalin's rare bird fauna is represented by wetland (lake-swamp and littoral –marine species) species reflecting the extensive presence of these habitats across the island and in particular the dynamic and productive coastal ecosystem of the north-east of the Island. Terrestrial species, representative of the mountainous and forested interior of the island and human-influenced habitats (e.g. commercial forestry or agricultural land) make up the remaining 30% of the rare bird fauna.

The majority of the RDB listed species are characterised by small populations and an uneven distribution, linked to either very specific habitat requirements, or other influencing factors such as human disturbance. Because of this, and issues associated with survey feasibility and access to often remote and difficult working areas, definitive information on the status of many species is lacking and our knowledge of many populations on Sakhalin is limited. However, for some species, this is not the case and there is significant data available for highly visible (from a conservation perspective) species such as white-tailed eagle and Steller's sea eagle, which have been well studied. Other species that have a distribution closer to the main areas of human population in the south of the Island have also been more intensively studied (e.g. Japanese robin and Latham's (Japanese) snipe).

15.3 SIGNIFICANCE OF SAKHALIN FOR BIRD MIGRATION ALONG THE EASTERN EDGE OF ASIA

The geographical position of Sakhalin Island indicates its potential as a migratory bridge for birds travelling between Japan and the mainland Far East.

Some bird populations that utilise habitats in northern Russia and Kamchatka during the spring-summer for breeding undoubtedly migrate to wintering areas through the Komandorskiye Islands and Kuril Islands and do not fly through Sakhalin. Whether Sakhalin is a bridge for other Palearctic birds originating from Khabarovsk Krai and the Russian North (e.g. many species of passerines) or whether the migratory population is largely comprised of local birds is not fully known. Certainly it is apparent that some species make use of Sakhalin as a staging ground during both spring and autumn migrations. Notable examples include Bewick's swan (*Cygnus columbianus bewickii*) and whooper swan (*Cygnus cygnus*) which congregate in large numbers in the north-east and the extreme south of the Island prior to moving to wintering grounds in Japan or breeding grounds in northern Russia. Certainly the importance of the Island in this respect is reflected by the fact that a significant number of birds recorded from Sakhalin are included in the international convention on migrating birds signed between Russia and Japan (see Table 15.2).

A bird-ringing project in Primorskiy Krai, jointly undertaken by the Amur-Ussuri Center of Bird Biodiversity (Vladivostok) and the Department of Environment Protection of Toyama (Japan) prefecture has ringed about 30,000 birds since 1998. However, up until now not a single record of a bird ringed from this area has been received from Japan or south-east Asia (FIRC 2000a). This work suggests that perhaps the migratory traffic between Japan and the Russian mainland (apart from a few exceptional species such as Japanese crane and hooded crane) is not as significant as assumed or that the so-called marine route of bird migration from the mainland over the Sea of Japan is not the most important for Far East Russian birds. This evidence again highlights the possibility that Sakhalin is an important migratory route for a number of bird species. Particular focus has centred on the presence of small flocks of chestnut bunting (*Emberiza rutila*) recorded during ringing/migration studies. This is a mainland Russia species which does not breed on Sakhalin and its presence on the Island may support the idea of the migration of northern mainland passerine birds through Sakhalin and then onto Japan and south-east Asia.

Bird ringing has also been undertaken on Sakhalin as part of the Amur-Ussuri study and data from this provides some evidence for a direct migration route between the island and Japan. In total, 7320 birds were ringed on Sakhalin between 1998 and 2004, covering both spring and autumn migration periods; many of the birds having been ringed during surveys for SEIC. Between 1998 and 2004, 13 birds (buntings and snipe) ringed on Sakhalin were caught in Japan and 2 birds ringed in Japan were caught on Sakhalin (bird ringing and migration studies are far more widespread and intensive on Japan than on Sakhalin). The recapture represents 0.18% of the birds ringed, a rate that compares favourably with rates observed (0.2%) from many years of ringing in Europe and Japan. This data clearly indicates that there is a significant migratory route between Sakhalin and Japan and that this route is used by a wide range of birds, from passerines through to waders and birds of prey.

The migration of waders has been studied in Sakhalin in more detail than for any other group of birds and three main spring migration directions have been identified. The first one is a northern route running from Hokkaido Island to Tonino-Anivskiy Peninsula and Aniva Bay. Some of these birds then fly further north along the eastern coast. The second route is along the mainland Russian coast up to Lazarev cape and from there over to Nevelsky on

Sakhalin, with further progress to the north or even to the south along the western and eastern coasts. The third direction is an eastern route going along the valley of the Amur River up to its delta with further movement over the Amur Strait to Sakhalin Island and along the west coast to the south up to Viakhtu Bay or along the eastern coast up to Lunsky bay (Nechaev, 1991). In autumn these directions reverse. It is likely that many passerine birds also follow the same routes.

Data on migratory bird populations has been collected from a number of studies undertaken in relation to the Sakhalin II project (see below). These include surveys of the north-eastern lagoons during the autumn migration of waterbirds (waders, ducks, swans and geese) and specific trapping exercises in the south of the Island at the Sokol ornithological research station. A list of the surveys undertaken for SEIC is provided in Table 15.1 and species-specific data is highlighted in Table 15.2.

15.4 SURVEYS UNDERTAKEN

Over the past seven years a number of surveys describing the ornithological fauna of the area potentially influenced by the Sakhalin II project have been undertaken. These surveys and studies have significantly contributed to our knowledge of the distribution of the bird fauna of Sakhalin and, in particular, in combination with vegetation data have lea to the development of relatively detailed characterisation of habitats and their bird assemblages. This work has enabled potential impacts of the project on the bird fauna to be identified. Of particular note is the work that has been undertaken in relation to RDB birds (e.g. Steller's sea eagle). Survey and monitoring programmes have been instigated specifically to gain data on these species and to ensure that mitigation measures, where required, are tailored to avoid or ameliorate adverse impact to these populations. The field data collection has been undertaken using a combination of specific methodologies that are widely utilised in ornithological surveys and research studies. These methods include en route census (Finnish Line Transect and absolute census) and point census for describing the bird assemblages of specific areas and mist netting for the study of migratory birds. The monitoring programme has been developed using standard line and point census techniques (see Section 15.9 for further details on monitoring).

In total, the surveys so far undertaken for SEIC have recorded the presence of at least 43 species of birds listed in the Sakhalin Oblast RDB within the area covered by project activities. The SSE survey and monitoring programme is described in a separate section of the EIA-A and readers are referred to this for additional information. Table 15.1, below summarises the ornithological surveys (excluding Steller's sea-eagle specific surveys) that have, so far, been undertaken in relation to the Sakhalin II project.

Table 15.1 Ornithological surveys undertaken for SEIC and the Sakhalin II project

Survey title and contractor	Survey type and coverage
Fauna Information and Research Centre, 1999. Current condition of the population of aquatic, rare and protected species of birds on the territory of the pipeline.	Literature review and compilation of field research (north-eastern coast of Sakhalin, in Lunsky bay from April, 10 till June 28 and from August 15 to November 9 1989, from June 1 till October 10 1990, from May 1 till July 16 and from September 20 till October

Survey title and contractor	Survey type and coverage
	22 1991). Episodic visits to the bays in 1993, 1995 and 1997, as well as research conducted along the pipeline route from September 26 - October 17 1998.
Fauna Information & Research Centre, 2000a. Ornithofauna of the north east coast of Sakhalin Island bays, Busse Lagoon, Aniva Bay and Tyuleniy Island	Literary review.
Fauna Information & Research Centre, 2000b. Avifauna of Sakhalin north east coast bays, Busset Lagoon and Aniva Bay – Field Survey	Field work undertaken at various locations during the period June 10th to November 20th.
Fauna Information & Research Centre, 2000c. Avifauna on Pipeline Route, Field studies.	Field survey and data collection along the pipeline route. July 2nd – October 16th (August 5th – October 16th, migration study)
Fauna Information & Research Centre, 2001 Avifauna of LNG plan/OET site in Prigorodnoye.	Field work at the LNG/OET undertaken monthly during the period June 10th 2000 to May 26th 2001.
Fauna Information & Research Centre, 2001. Monitoring of fall migration of aquatic birds at bays of NE shore of Sakhalin Island and Busse Lagoon. 2001	Fieldwork 14-26 September and October 7-16 in north-east lagoons. Aug 17, Oct 20 and Nov 4 at Busse lagoon.
Far Eastern State University, 2002a Environmental Survey for Sakhalin-2 project, Report Field and Desktop study of Avifauna along pipeline route, 2001.	Summary of all data collected since 1998 and mapping of bird habitats and RDB species within 4000m corridor along the pipeline route. Some limited field survey work undertaken during the second half of August and September.
Far Eastern State University, 2002b Expert judgement of avifauna status in the corridor of Botasino altered lateral pipeline route section.	Desk top study using data from previous survyes and a short period of field research along the Botasino section of the pipeline, in specific Chaivo bay
Far Eastern State University, 2002c Field and deskstop study of avifauna in construction sites along pipeline route.	Desktop analysis of habitat and bird data for construction sites along the pipeline route. Field survey work in 1-2km zones around all sites and some additional places along the pipeline corridor, during the period August 9th – September 20th.
Sakhalin State University, 2002 Baseline survey of flora and fauna (including birds) in the corridor of the BSNB (Big South Nysh Bypass) and BS2, Gastello site.	Fieldwork undertaken September 19th – October 1st 2002.
Amur-Ussurian Centre for Biodiversity of Birds, 2003. Studying rare and protected bird species along the surface pipeline route, at sections of pump and compressor and gas distribution terminal.	Field survey and monitoring work undertaken at eight sections along the pipeline route at various times during the period April 26th to June 23rd.
Fauna Information & Research Centre,	Field survey work undertaken in the north-east lagoons during the period June-July

Survey title and contractor	Survey type and coverage
2003 Studies of the ornithofauna of the lagoons of the north-east coast of Sakhalin during the breeding season.	2003.

15.5 DESCRIPTION OF MAIN HABITATS AND ASSOCIATED BIRD ASSEMBLAGES

A variety of terrestrial, wetland and coastal habitats are present on Sakhalin Island, all of which support distinct bird assemblages. Studies undertaken for the Sakhalin II project (see above), along with previous research and field studies, have enabled the main bird assemblages that characterise many of these habitats (i.e. those ones that the project activities potentially influence) to be identified. Although the ornithological and botanical surveys were undertaken separately and have, apart from the work on Steller's sea eagle, been confined largely to the footprint of the project area, the data obtained lends itself to the development of an ecosystem led approach to the identification and analysis of the bird fauna, whereby habitat characteristics and associated bird species can be considered together at a more functional level.

A detailed analysis of the intricate nature of the connections, relationships and influences between all of the physical and biological components that together constitute an ecosystem is beyond the scope and requirement of this assessment. However, a broader analysis of the main habitat types and their recorded bird assemblages, as described in the following sections, does enable further definition of the more critical habitats, particularly with respect to RDB species, to be identified. This, in turn, provides the basis for further consideration of the potential impacts and effects of the project on the bird populations themselves (e.g. disturbance during the breeding season) and the impact on supporting habitats (i.e. potential changes to the extent of habitat or physical processes that control habitat function and structure). This is discussed in more detail in Section 15.7. Table 15.2, at the end of this Chapter, provides further information on all of the Sakhalin Island RDB bird species, their distribution and habitat preferences and recorded presence in relation to Sakhalin II project activities.

15.5.1 Water bodies (rivers, lakes)

The bird assemblage of rivers, lakes and ponds is relatively small, but characteristic wherever present across the Island. Species such as common sandpiper (*Actitus hypoleucos*), kingfisher (*Alcedo atthis*) and grey wagtail (*Motacilla cinerea*) are usually dominant in riverine habitats and are evenly distributed across Sakhalin. In Tymovsky Raion, low numbers of brown dipper (*Cinclus pallasi*) occur on rivers. Characteristic duck species found on rivers are mandarin duck (*Aix galericulata*), goldeneye (*Bucephala clangula*) and goosander (*Mergus serrator*). Mandarin duck breed in the forested valleys of small mountain rivers, typically like those crossed by the pipeline route. Goldeneye often occur at river mouths, primarily in the north of the Island, while goosander occurs in the middle reaches of the larger rivers such as the Pilenga and Tym.

There are only a few large lakes close (within 5km) of the pipeline route, the main one being Lake Lebyazhie. This water body is a nesting ground for many aquatic and wetland species and an important stopover for migrating sandpipers, ducks and other waterbirds en-route to or from the north of the Island, or the Russian arctic. Species that are regularly recorded here include osprey (*Pandion halieatus*), white-tailed fish eagle (*Haliaeetus albicilla*),

Aleutian tern (*Sterna camtschatica*) and whooper swan. Long-billed murrelet (*Brachyramphus perdix*) is also known to use Lebyazhie Lake.

15.5.2 Meadows and arable agricultural land

The bird fauna of this habitat grouping consists of elements of both meadow communities and woodlands in which hay meadows have been created. In arable areas, the typical meadow assemblage largely disappears and is only present around the margins of land under arable production.

Other than a number of resident species, this habitat type typically provides foraging grounds for species such as jungle crow (*Corvus macrorhynchos*) and carrion crow (*Corvus corrone*) and rufous turtle dove (*Streptopelia orientalis*). These species do not nest here owing to a lack of suitable trees. Although data is generally scarce, the meadow habitat of these largely lowland areas is likely to support populations of the RDB Japanese quail (*Coturnix japonica*), which has been recorded on several occasions during survey work.

15.5.3 Tall grass/herb meadows

Tall grass/herb communities are typical of Sakhalin's southern and central regions. This habitat type does not occupy large tracts of land, but because of its diverse structure and composition tends to provide suitable conditions for a wide range of foraging and nesting bird species. Often this habitat type is found in close proximity to rivers and streams and is invariably surrounded by forest/woodland. As a consequence, the bird assemblage comprises a large number of species that typify more open forest and valley woodland habitat (e.g. brown thrush (*Orpheus rufus*)) with woodpeckers, narcissus flycatcher (*Ficedula narcissina*), black-faced bunting (*Emberiza spodocephala*) and rufous turtledove being commonly present. Small copses of trees within the meadows often provide suitable nesting habitat for woodpeckers, turtle-doves and grey-capped greenfinches (*Chloris sinica*). Meadows adjoining areas of forest are often included in the nesting or feeding grounds of forest birds that permanently forage in these areas (e.g. species of tits, siskins (*Spinus spinus*), bullfinches and Pallas's willow warblers (*Phylloscopus proregulus*)). Japanese snipe (*Gallinago hardwickii*), may often nest on the periphery of tall grass meadows and hay meadows. Although structurally similar, tall reedgrass growth in forests/woodland of the Okhinsky and Nogliksky regions supports an impoverished bird fauna in comparison, although several of the species inhabiting tall grassland further to the south are present.

15.5.4 Wet sedge meadows and bogs

The peatlands characteristic of northern Sakhalin and many of the river plains cover a considerable area (e.g. approximately 25,000 km^2 in Okhinsky Raion alone), but support a relatively impoverished breeding bird fauna in comparison to other habitats, with only 5-7 species being definitively linked to this habitat type. Species such as lanceolated grasshopper warbler (*Locustella lanceolata*), Middendorff's grasshopper warbler (*Locustella ochotensis*), green-headed wagtail (*Motacilla taivana*) and yellow-breasted bunting (*Emberiza aureola*) dominate the assemblage. These typical wetland species are complemented by other species found in adjacent and transitional habitats (open water, shrub, grassland and forest), giving rise to an overall assemblage with about 10-15 representative species (FESTU 2002a). Areas of open water and stands of reed/emergent vegetation within the peatlands

may also provide habitat for a range of other characteristic species such as ducks, waders, grebes etc. Of particular note is the potential for this habitat to support rare species such as Japanese snipe and Schrenk's little bittern (*Ixobrichus eurhythmus*).

15.5.5 Larch/Ledum marshland

The waterlogged larch-ledum complex is one of the most widely represented habitat types along the pipeline route, particularly in the north of the Island, and supports a characteristic bird assemblage, often comprising an inter-mixture of species from several associated habitats. The presence of larch means that representative species from larch forests are often encountered in these marshy areas, notably nuthatch (*Sitta europea*), Siberian bluechat (*Tarsiger cyanurus*), Pallas's willow warbler, coal tit (*Parus ater*) and Mugimaki flycatcher (*Ficedula mugimaki*). These species primarily inhabit the periphery of the marshland areas where this habitat merges into larch forest or the tree density increases. Other species typical of open ground usually occur within the main marsh areas and include species such as yellow-breasted bunting, brown shrike (*Lanius cristatus*), stonechat (*Saxicola torquata*), dusky willow warbler (*Phylloscopus fuscatus*) and lanceolate grasshopper warbler.

Of particular interest is the potential for this habitat type to support breeding long-billed murrelet in the Nogliksky and Dolinsky (in the vicinity of Lake Lebyazhie) raions.

On the north-east coast, both the above habitat types (wet sedge marsh/bogs and larch/ledum forest) may also support a number of other breeding species that are characteristic coastal specialists. These include the Sakhalin subspecies of dunlin (*Calidris alpina actities*), which breeds close to the shore in open areas of marsh with pools and the spotted greenshank (*Tringa guttifer*), which inhabits sparse waterlogged larch forest close to the lagoons. Areas of open water in the north-east coastal wetland complex also provide habitat for several species of duck (e.g. teal (*Anas acuta*), mallard (*Anas platyrhynchos*)), grebes and divers. The coastal wetlands of the north-east coast are particularly important during the spring and autumn when large numbers of waterbirds (ducks, swans and waders) congregate here en route to breeding or wintering grounds. A significant number of RDB species are recorded from this habitat during migration (e.g. several species of sandpiper, whooper and Bewick's swan, swan goose (*Cygnopsis cygnoides*), baikal teal (*Anas formosa*) and spot-billed duck (*Anas poecilorhyncha*). Further information on many of the rarer species of this particular migratory assemblage is provided in Table 15.2.

15.5.6 Alder-willow floodplain forests

The bulk of the bird assemblage associated with this habitat comprises species typical of woodland-shrub complexes, including Radde's (*Phylloscopus schwarzi*) and dusky willow warblers, Siberian rubythroat (*Luscinia calliope*), lanceolate grasshopper warbler and others. Also present are species typical of coniferous and mixed forests (Siberian bluechat, goldcrest (*Regulus regulus*), Oriental bullfinch (*Pyrrhula griseiventris*) and coal tit). Tits are generally common in this habitat type and from the beginning to the end of summer they begin moving along river valleys in large multi-species flocks. Large areas of the river valleys in North Sakhalin are covered with coniferous and mixed forests, the presence of which also lead to the

introduction of additional species into the bird assemblage of adjoining alder-willow forests.

15.5.7 Poplar-willow forest

The characteristic assemblage of broadleaved river valley poplar-willow forests is represented by 27-29 bird species, with about another 17-18 species also being regularly recorded. As in alder-willow forests, many of the secondary group of species comprises representatives of tree-shrub growth habitat on the edges of the valley forests. Small areas of remaining forest comprising Manchurian ash, wych-elm and other broad-leaved tree species are of particular importance as they play an important role for a number of rare and protected species, notably all rare breeding owls, osprey, white-tailed sea eagle, Japanese sparrow hawk (*Accipiter gularis*), mandarin duck as well as commercially valuable birds such as hazel grouse (*Tetrastes bonasia*), woodcock (*Scolopax rusticola*) and tree-nesting ducks. The majority of the tree-nesting species require old, tall and large-diameter tree trunks with hollows for nesting. Therefore, the removal of these trees could potentially have an adverse consequence on these breeding populations. It should also be noted that valley forests (both poplar and alder) also support high numbers of birds on passage during seasonal migration.

15.5.8 Japanese stone pine with larch and lichens

In relation to the area influenced by the Sakhalin II project, this habitat type is present only in Okhinsky and Nogliksky Raions. A number of birds are specifically associated with Japanese stone pine, in terms of distribution and ecology, notably redpoll (*Acanthis flammea*), Pallas's rosefinch (*Carpodacus roseus*), pine grosbeak (*Pinicola enucleator*) dusky willow warbler and nutcracker (*Nucifraga caryocatactes*). In areas where larch is present the assemblage includes elements typical of this forest habitat (willow ptarmigan (*Lagopus lagopus*), three-toed woodpecker (*Picoides tridactylus*), great grey shrike (*Lanius excubitor*), Pallas's rosefinch and the RDB hawk owl (*Surnia ulula*)). On the coast, Japanese stone pine with a lichen understorey may dominate completely and is often found growing on shingle/sand ridges. Such habitat is important for breeding Aleutian tern, particularly in the Lunsky Bay area.

Japanese stone pine growths are frequently affected by fires, tree felling and other human activities. These changes in the habitat can lead to fluctuations in the associated bird fauna, particularly with respect to the populations of some species such as great grey shrike and willow ptarmigan, which take advantage of the differing habitat conditions brought about through vegetation clearance and the subsequent successional processes.

15.5.9 Larch/Ledum forests

Larch/ledum forest is one of main habitat types present in the interior of the Island and supports one of the richest and most diverse bird faunas. Up to 75 bird species were observed in larch/ledum forests, with their number varying from 51 in Dolinsky and Makarovsky Raions to 69 in Nogliksky Raion (FIRC 2000c). This diversity can be explained by the high degree of transformation and significant level of fragmentation of this habitat. As a consequence, birds from a variety of other adjoining habitat types are also present in, and make use of these larch forests. Typically the bird assemblage therefore comprises

a significant number of species that are temporary inhabitants of this habitat type. The larch/ledum forests of Sakhalin's southern, central and northern raions have differing importance as bird habitats. Mature northern larch forests, particularly in Nogliksky Raion, are typical habitats of a number of rare, protected or species with small populations (e.g. Siberian spruce grouse (*Falcipennis falcipennis*) black billed capercaillie (*Tetrao uragalloides*) and white-throated needletailed swift (*Hirundapus caudacutus*). Of note is the repeated observation and recording of long-billed murrelet in this habitat type in the north of the Island.

The bird assemblage of dark coniferous forests (spruce/fir and larch) is also compositionally similar to that of larch/ledum forests, largely due to its fragmented nature and mosaic relationship with other habitat types.

15.5.10 Forest habitats affected by fires

In the north of the Island, significant areas of larch/ledum and Japanese stone pine habitat have been modified by forest fires. These sites now support bird assemblages which combine elements of the original habitat type and species that are typical of disturbed and more ephemeral vegetation of a particular successional stage (e.g. willowherb or reedgrass). These latter species include olive-backed pipit (*Anthus hodgsoni*) and Siberian rubythroat, both species of scrub vegetation across the island. Other species include Radde's and dusky willow warblers, brown shrike (*Lanius cristatus*), lanceolate grasshopper warbler, black-faced bunting, black-browed reed warbler (*Acrocephalus bistrigiceps*) and stonechat (*Saxicola torquata*)). Also commonly present is the common cuckoo (*Cuculus canorus*), which is a nest parasite of the Siberian rubythroat and black-browed reed warbler and the Himalayan cuckoo (*Cuculus saturatus*), which is a nest parasite of dusky willow warbler and black-faced bunting. Dead trees within the burnt areas provide feeding habitat for several species of woodpecker, notably black woodpecker (*Dryocopus martius*) and great spotted woodpecker (*Dendrocopos major*).

15.5.11 Dry herb meadows

This habitat occurs in the south of the Island (Korsakovsky to Poronaisky Raions). The assemblage includes birds associated with grassy-shrubby vegetation of open spaces and which are present practically all over Sakhalin (Radde's and dusky willow warblers, grey-capped greenfinch, Siberian rubythroat, black-browed reed warbler, long-tailed rosefinch (*Uragus sibiricus*), black-faced bunting, etc). Other, temporary species of the assemblage comprise foraging species from adjacent forest/woodland habitats.

15.5.12 Pine and larch plantations

Coniferous plantations have a scattered distribution across the island and, as a rule, typically occupy relatively small areas. The specific diversity and nesting density (both total and by-species) in plantations is determined by four basic parameters: age, planting density, size and diversity and nature of surrounding habitats. Mature very low-density growth pine plantations with an admixture of other coniferous trees and shrub understorey are characterized by a higher diversity of species, largely due to the penetration and use of atypical species e.g. Radde's willow warbler, olive-backed pipit and Siberian rubythroat. The main core of the assemblage (i.e. found throughout the range

of the habitat) comprises species typical of dark coniferous forest such as Himalayan cuckoo, Oriental bullfinch and Pallas's willow warbler. These plantations may be of importance as foraging habitat for post-nesting and migrating flocks of passerines (e.g. tits, warblers and flycatchers).

15.6 CRITICAL HABITATS FOR RDB SPECIES

On the basis of the data collected for the Sakhalin II project and from other available ornithological literature it is apparent that there are several ecosystems, habitat types and areas of the Island that are of particular significance for RDB bird species (as highlighted above) in relation to project activities. These are:

The lagoon/wetland ecosystem of the north-east – the wetland complex of coastal lagoons and associated wet larch/Ledum forest and bogs of the coastal plain support a diverse bird assemblage including the highest diversity of RDB species for any one particular ecosystem. Breeding birds of particular note include – Steller's sea-eagle, white-tailed sea-eagle, spotted greenshank, the Sakhalin subspecies of dunlin, Aleutian tern, swan goose, ruff (*Philomachus pugnax*) and long-toed stint (*Calidris subminuta*); while the area also supports large populations of waterbirds on migration (both spring and summer) including Bewick's swan, whooper swan, spoon-billed sandpiper (*Eurynorhynchus pygmeus*), Baikal teal, sharp-tailed sandpiper and red-necked phalarope (*Phalaropus lobatus*).

Northern mature larch/Ledum forests – survey work (AUCBB 2003) has identified that this habitat is of particular importance for species such as Siberian spruce grouse, black-billed capercaille and Tengmalm's (*Aegolius funereus*), pygmy (*Glaucidium passerinum*) and northern hawk owls. There is also very strong evidence to suggest that long-billed murrelet is breeding in this habitat in the north of the island. This habitat also, on the basis of survey data, supports the most diverse resident breeding bird assemblage found on the Island.

Mature willow/alder forests in main river valleys – the complex of mixed woodland found along some of the main river valleys provides important breeding habitat for tree-nesting birds such as mandarin duck, osprey, white-tailed sea-eagle, owls (Tengmalm's, pygmy owl) and Japanese sparrow hawk. These forests also act as important migratory corridors and wintering habitat for large numbers of passerines.

Shallow intertidal waters and lagoons in Aniva Bay – the Salmon Bay area of Aniva Bay is particularly well known as a staging ground, normally during the spring, for a wide range of waterbirds including large numbers of Bewick's and whooper swans and RDB waders. Similarly, Busse lagoon often supports significant populations of waterbirds on migration as well as white-tailed sea-eagle during the winter and on migration.

Other areas and habitats are also of critical importance (e.g. Lake Lebazhiye and the mixed forests of the Krilyon Peninsula), but are not considered further in this discussion and analysis as they lie outside of the influence of project activities.

With respect to these key habitat types, three main groupings of RDB bird species can be identified:

Migratory birds on transit – This is the largest grouping of species and comprises those that may make temporary use of habitats during spring and autumn migrations. Many of the species included in this group are only rare visitors to Sakhalin (e.g. cranes and egrets, see Table 15.2), while others are regular and abundant visitors (e.g. whooper's and Bewick's swans). This includes virtually all of the species that make use of shallow intertidal waters of Aniva Bay and many of the species present in the north-east coastal wetlands. As long as project activities do not lead to the degradation of these habitats and are undertaken outside of potential areas and periods when disturbance could occur then there should be a negligible impact on these species as a result of undertaking the proposed works (see Section 15.7 for further discussion).

Migratory, breeding species. This smaller group includes those species which migrate to the island to breed and includes species such as spotted greenshank, the Sakhalin subspecies of dunlin, ruff, Japanese snipe, mandarin duck and Steller's sea-eagle. The majority of these species are associated with the north-east coastal wetlands and other wetland habitats on the island (e.g. lakes, pools, marsh). Some of the species present in this group have very small populations, e.g. spotted greenshank, which could potentially be adversely affected if areas of supporting habitat were degraded as a result of project activities. It should be noted that many of the wetland species in this group comprise small breeding populations, occur sporadically and are associated with habitats (e.g. open water) that would be not be influenced by the project activities. Such species include Schrenk's little bittern, moorhen, coot, Baillon's crake, little grebe, bittern and spot-billed duck.

Resident species – this grouping includes those species that are effectively resident (i.e. present on the island all year long) or sedentary in their behaviour. These species are mainly forest inhabitants and include birds such as Siberian spruce grouse, black capercaillie, eagle owl (*Bubo bubo*), pygmy owl and Tengmalm's owl. Also included in this group is Blakiston's fish owl (*Ketupa blakistoni*), which although despite not having been seen for 50 years, may still be present on the island. It has not been recorded during survey work undertaken for the project, but there is some evidence (e.g. a feather found in 1998) to suggest that it may still be resident in some suitable river valleys. The majority of the species in this group either have localized or small populations and occupy specific breeding areas and sites (e.g. Siberian spruce grouse) and therefore habitat change and loss for these species could be of critical importance to population levels as a whole. Species such as Steller's sea-eagle, white-tailed sea-eagle and long-billed murrelet (breeding for long-billed murrelet has not yet been confirmed, but is likely) also fit into this category as they all have localized breeding sites that are used year after year.

15.7 IMPLICATIONS OF THE PROJECT ACTIVITIES FOR RDB BIRD ASSEMBLAGES

In relation to human activity and development, the conservation of the majority of rare bird species populations can be achieved through actions relating to two main aspects:

- Minimising or preventing disturbance at critical periods (e.g. during the nesting/breeding season); and

- Maintaining ecosystems and supporting habitats with respect to all of their functional properties and uses for birds (i.e. processes and structure that support breeding, feeding, migrating and wintering usage).

The first of these aspects can be dealt with through the sensitive timing of construction works and minimizing the potential zone of influence in areas of known usage by RDB bird populations. Data obtained from baseline surveys and initial pre-construction monitoring has been used in identifying sites (i.e. habitats) of particular importance within the influence of the project area (e.g. along the pipeline route). Specific mitigation measures, as listed below, have been developed as part of the EIA process and are being implemented in these areas to avoid or minimize potential disturbance to RDB bird populations during the construction works:

- Where practical, construction activities (e.g. vegetation clearance) that occur within or influence habitats of particular importance for coastal RDB birds (waders and wildfowl), shall be timed to avoid the most sensitive nesting periods (i.e. May-August). This timing is based upon the breeding period of species such as dunlin and spotted greenshank, which typically arrive at their breeding sites in mid-late May and leave for wintering grounds in late August-early September. The practicalities involved in avoiding construction activities at sensitive times for this bird assemblage will be determined through discussion between contractors and relevant SEIC personnel. Further information on the key periods when RDB coastal bird species are present on the island is presented in Table 15.2;
- The footprint of areas that traverse available habitat for coastal birds shall be minimised and construction shall take place as quickly as possible;
- If endangered bird species (other than Steller's sea-eagle for which specific measures are being adopted, as set out below) are encountered, SEIC shall, whenever possible, minimise the presence of people in the nesting and feeding grounds during the breeding / rearing periods (April – September). This period covers the breeding and fledging season for all RDB species likely to be present along the pipeline route and at construction sites (e.g. LNG plant and OPF);
- Specific mitigation measures shall be applied to each individual case where Steller's Sea-eagles might potentially be affected by the project. Specific mitigation for each nest within the 2005 construction area will be developed over the 2004-2005 winter season and implemented before the breeding season commences in spring (EIA-A, Steller's sea-eagle); and
- Further mitigation measures for Steller's Sea-eagles that are developed as part of the Sea Eagle Research Programme (SERP) shall be considered when preparing specific mitigation measures (EIA-A, Steller's sea-eagle).

These mitigation measures specifically deal with potential short-term disturbance impacts on individual birds and are not designed to ameliorate the longer term potential impact of project activities on the habitats and processes that support ornithological interests.

The whole area of habitat maintenance and minimizing the impact of the project on ecosystems and ecological function is dealt with through a large raft of other environmental mitigation measures (these are too numerous to list here but are contained in the Health, Safety, Environment and Social Action Plan (HSESAP) Part 2 tables on Land Management (Table 2.5) and Onshore Biodiversity (Table 2.3) and the reader is referred to these for further information). These mitigation measures and commitments are aimed at maintaining physical processes (e.g. soil, air and water) during construction and operation and restoring habitats affected by project activities to a baseline condition, where this is practical. If successfully implemented these measures should ensure that the ecological processes that support habitat structure and function (i.e. ecosystem processes) for RDB birds (and potentially the vast majority of other bird species) are maintained intact during construction and operation. However, the direct effects of project activities on vegetation and habitat extent are more difficult to ameliorate. These effects fall into two areas – habitat loss and habitat disturbance/change:

Habitat loss - the construction of 'permanent' project facilities such as the LNG plant and the OPF will lead to the direct loss of habitat. However, the potential usage of these areas by breeding and migrating birds was taken into account (through undertaking pre-construction surveys) during the planning and EIA process to ensure that the potential impact on RDB bird populations was minimized, as far as practically possible (i.e. that habitats critical to the survival of RDB populations were not present within the footprint of the construction sites). No further operational mitigation measures are required in respect of this impact.

Habitat change – As discussed above, potential change to ecological processes has been assessed as part of the EIA and ongoing environmental assessment process and any identified impacts are being ameliorated through a significant number of specific mitigation measures aimed at maintaining overall environmental quality during construction and operation. However, in areas where project activities lead to the disturbance of soil and associated vegetation or vegetation clearance, the potential exists for longer term change to vegetation composition and structure and thus change to habitat characteristics. Essentially, this impact relates to the onshore pipeline ROW, where existing vegetation will be cleared to enable burial of the oil and gas pipelines. The pipeline passes through a number of habitat types, all of which have some importance for RDB bird assemblages (see section 15.5). In relation to the critical habitats listed in Section 15.6, where possible the pipeline has been routed to avoid such areas and it has also been routed to pass through areas that have already been affected by human activity (e.g. roads, electricity pylons etc.), therefore reducing incursion into relatively intact habitats that are more likely to support RDB bird populations. Thus, areas of the north-east coast where wetland and lagoon habitats predominate have been avoided, as have significant areas of intact larch/Ledum forest. Mitigation measures have also been incorporated into the construction process to minimize the level of vegetation disturbance through wetland areas and to promote the restoration of vegetation to its original condition (see HSESAP, Part 2, Table 2.5, Land Management for a list of mitigation measures). These measures, if successfully implemented, should ensure that the habitat structure that maintains the majority of RDB bird species using these habitats (notably the transient and migratory/breeding groups described in Section 15.5) remains intact during the operation of the project.

However, forest and woodland vegetation along the pipeline ROW cannot be restored to its original state for reasons of safety and technical and practical maintenance of the pipeline. The lack of opportunity to restore forest and woodland habitats along the pipeline ROW for the duration of the operation of the pipeline, and for several decades beyond, means that the bird assemblages using these forest habitats will potentially be affected by this impact, as in effect there would be an overall reduction in habitat area. As discussed briefly in Section 15.5 these species include Siberian spruce grouse and black capercaille, which have very localized breeding sites in larch/ledum and dark coniferous forests, and tree-nesting species such as owls, mandarin duck and long-billed murrelet. Of importance to species such as mandarin duck and several owl species is the potential loss of larger, older trees in the river valleys. Similarly, long-billed murrelet maybe using forest habitat that is restricted in distribution and the loss of any of this area may adversely impact upon the breeding population (the breeding of this species on the island is not confirmed, but is likely, see Table 15.2 for more details).

15.8 AMELIORATING LOSS OF BREEDING HABITAT FOR RDB FOREST - WOODLAND BIRD SPECIES

As discussed above, mitigation measure to offset potential harm to RDB species such as Steller's sea eagle and RDB bird assemblages as a whole (e.g. undertaking the clearance of the pipeline ROW in areas of known importance during the non-breeding season) have been incorporated into the project and are being actively implemented. In addition, a large number of measures are being implemented to ensure that project activities do not adversely affect ecosystem processes that support critical habitats for RDB and migratory birds. These measures will ensure that the habitats and RDB bird populations of areas such as the north-east coastal lagoons are maintained intact during project construction and operation.

However, it is apparent that habitat change along the pipeline ROW may adversely affect some RDB species, notably those that are resident or breeding in larch/Ledum forests in the north-east and willow/alder forest in river valleys. The importance of these habitats has been confirmed by survey/monitoring work undertaken for the project (AUCBB 2003). Certain measures have already been incorporated into the pipeline/ROW construction process to minimize potential impacts. These are:

- Tree clearance shall be kept to a minimum, and typically limited to the footprint of the site and any safety buffer zone;
- Do not cut trees outside of the approved construction work area to obtain timber for riprap or equipment mats; and
- Within construction site boundaries existing vegetation shall be retained wherever possible. Trees and areas to be preserved and protected shall be identified and clearly marked as the work area is defined.

Other potential measures include, where practical, avoiding multiple crossings of rivers or avoiding routing of the pipeline along floodplains in valleys where there is significant willow/alder forest/woodland cover.

While these measures may limit the loss of forest resources outside of the ROW and potentially also mean that some of the larger, older and more significant trees are retained, in reality their implementation will not offset the loss of potential breeding habitat along the ROW for the forest species highlighted above. The replacement of forest habitat and specific breeding habitat provided by individual, mature trees along the pipeline ROW is not an option due to the need to maintain the ROW in a vegetative condition whereby inspection and maintenance can be undertaken. The actual impact of this habitat loss on this group of RDB birds is difficult to quantify. It is apparent from the pre-construction monitoring survey ((AUCBB 2003), see Table 15.2 for more detail) that some species, notably Tengmalm's owl, pygmy owl and mandarin duck occur more regularly within the zone of the ROW in suitable habitat (see Section 15.5 for a description of these habitats). It can therefore be assumed that wherever these habitats within the range of these species that they may be present. Suitable mitigation measures therefore need to be geared towards dealing with the loss of potential breeding sites (i.e. tree hollows) wherever the ROW passes through suitable habitat, as the availability of breeding sites may be a key limiting factor on population size.

Potentially, the loss of breeding sites (i.e. tree hollows) that these trees provide for birds such as mandarin duck and owls could be mitigated through the installation of artificial nest boxes. Schemes elsewhere around the World have proved that artificial nest boxes for owls and mandarin duck can be very successful at maintaining and even enhancing populations (e.g. up to 90% of some populations of Tengmalm's Owl in Europe are nesting in artificial nests). A nest box scheme on Hokkaido, Japan, has proved to be particularly successful for enhancing breeding Blakiston's fish owl populations. It is possible that the provision of nest-boxes could increase the population density of some species present along the pipeline ROW and perhaps increase breeding productivity by providing new nest sites for young pairs that would otherwise be unable to locate suitable breeding sites.

It is therefore proposed that an additional mitigation measure is adopted and implemented. A trial nest box scheme will be introduced in 2005 at a selected locality(ies) along the pipeline ROW to determine the potential for artificial nests to provide breeding habitat for owls and mandarin duck. If monitoring of this scheme proves that it is successful then it could be developed at other selected locations and for specific species along the pipeline route. It is likely that between 10-20 nest boxes will be installed for the trial and the work will be undertaken in conjunction with a local school as a means of furthering environmental education.

15.9 MONITORING

A construction specific ornithological monitoring programme has been developed, covering activities along the pipeline ROW, LNG plant and the OPF site. This programme includes for three monitoring periods, pre-construction, during construction and post-construction and has been designed to assess the potential effects of the project on RDB bird populations. The programme is summarized in the HSESAP, Part 2 Annex C, but the onshore pipeline programme is reproduced below to demonstrate context with respect to the discussion above.

The monitoring programme has been designed to monitor a number of target RDB species (as listed below) at specific locations along the ROW within the

four-kilometre (2+2 km) envelope of the pipeline route. As far as possible, the monitoring sites have been selected to represent the range of habitats that support the key RDB bird populations along the route and which present differing susceptibilities to external impacts. The monitoring consists of en-route field surveys that are to be conducted during key nesting periods for the target species (routes comprising seven-ten day periods from mid-April till July). At each location en route census and point census techniques are being used to determine the RDB species and populations present. On the basis of the data collected during the pre-construction survey, specific routes for representative habitats supporting RDB species will be selected for future monitoring.

The 10 specific locations that have been selected for monitoring cover approximately 10% of the total length of the ROW and comprise eight sections of the 4km pipeline corridor, from 4 to 32km each in length and two construction sites (the Gastello and GDT). These monitoring sections have been selected to provide geographic spread along the pipeline route, comprehensive coverage of the key habitat types present and representation of the main RDB assemblages. Forest habitats, such as spruce/larch woodland and marshy, mixed woodland (birch, larch, willow and alder) are well covered, as are wetland valley plain habitats (sedge wetlands, riverine woodland and meadows). Small areas of arable agricultural land and human habitation are also inlcuded in the monitoring programme.

1 Between 564km and 596km of the pipeline (Anivsky and Korsakovsky Districts) – from Yuzhno-Sakhalinsk's south border to the LNG/OET site.

The main habitats present include; spruce-fir plantations, small fragments of dark coniferous forest, mixed larch-spruce-fir and reed grass communities (secondary growth replacing original dark coniferous forest). Deciduous tree species are present on the lower mountain slopes with willow and alder woodland present in the river valley. Agricutural land predominates in the peatlands of the Susunayskaya depression.

2(A) Between 457 km and 495km of the pipeline (Dolinsky District) – within the Izubrovy reserve. **(B)** Between 457km and 495km of the pipeline (Dolinsky District) –settlement of Sovetskoye – Lebyazhie Lake.

The northern half of the section (north of the Kirpichnaya River) is dominated by coniferous forest comprising secondary growth spruce and fir, small fragments of dark coniferous forest, pine plantations and larch forest in the valleys, often with a bamboo understorey. In the valley forest, old willows occur along with a thick understorey of annual and perennial shrubs (e.g. meadowsweet, nettle and *Cacalia*). To the south of the Kirpichnaya River, land in agricultural production prevails comprising meadows of mixed grasses and herbs. Irrigation canals are frequent. Outside of the pipeline construction zone, damp, shrub vegetation occurs along the margin of Lebyazhie Lake.

3 Between 353 km and 376 km of the pipeline (Makarovsky District) – within the limits of Makarovsky reserve.

This section is characterised by the development of secondary, deciduous small-leaved forest (alder, birch and rowan. Grass communities occur in place of much of the original, felled dark-coniferous forest. In the northernmost,

central and south-western part of the section coniferous and small-leaved deciduous forests alternate with areas of dry, mixed species grassland. In the north-east, remnants of dark-coniferous forest occur in combination with alder, willow and poplar woodland along the rivers.

4 Between 75km and 85km of the pipeline (Tymovsky District) – forests in the valley of the Tym river near the settlement of Tymovskoye.

Secondary larch and small-leaved deciduous forest prevails along the section. In the valleys of the Tym and Malaya Tym, the woodland vegetation comprises willow, alder and various Salix species with small stands of poplar and elm. Areas of the river floodplains support thick growths of young willows and large amounts of woody debris deposited during flood events. Between the Tym and Malaya Tym agricultural meadows with irrigation channels predominate.

5 Between 30km and 44km of Nysh re-routing (Nogliksky District) – forests in the valley of the Nabil river.

Secondary growth, sparse dark-coniferous and birch forests predominate with near-river and valley woodland comprising willow, alder and sallow species being present along the Nabil River.

6 Between 3km and 7km and 24km-30km of Nysh re-routing (Nogliksky District) – mountain main dark-coniferous forests and plain sparse growth of trees along the Southern driveway.

The vegetation along the 3-7km section comprises waterlogged, sparse larch forest which gives way to spruce-fir-larch forest on the mountain slope with areas of larch with *Ledum palustre* (wild rosemary) understorey. In the valley of the Orkunii River, water-logged, small-leaved and coniferous forest is present. On the gentle mountain slopes between 24-30km, mature, larch-ledum forest with individual birch and spruce trees predominates.

7 At the section from 157km of the northern section of the pipeline to the intersection of the route with the Vazi river (Nogliksky District).

The main habitat type along this section comprises spruce and fir-larch forest with small areas of reedgrass, and larch-ledum forest with sedges. Coniferous and small-leaved forest in combination with areas of grass meadow are located along the headwaters of the Nizhny, Nagorny and Vazi rivers. Much of the area has been disturbed due to road construction and timber felling.

8 Between 75km and 104km of the northern section of the pipeline (Nogliksky District)

Dry and water-logged larch forest with Ledum, Middendorf's birch and bilberry occupies much of the section. Spruce and fir forest occupies watershed areas, while willow, alder and bird-cherry forest occurs in the lower reaches of the river valleys. Non-forested sections are occupied by reedgrass, mixed grass species meadows and marsh. The coastal section along the Nyisky lagoon comprises areas of sedge and reedgrass meadows with water-logged sparse, larch forest with Ledum, cloudberry and *Rhododendron*. The forest areas have been significantly affected by fire.

Gastello construction site - The habitat present at the site for the PCS-2 (Booster Station 2) comprises secondary larch and spruce forest with mixed small-leaved (alder and willow) woodland. Areas of waste ground, glades with reedgrass and grass meadows occur near to the settlement of Gastello.

GDT construction area (8km from Val) – Habitat at the site comprises sparse larch forest with spruce and young alder woodland. Willow and alder forest occurs along the Siggour river with marshes and sedge and reedgrass meadows.

The parameters to be measured at each of the designated sections are:

- Structural characteristics and areas of rare and protected birds' habitats; and
- Extent and other characteristics of ecological interdependency within the determined habitats.

The following species have been selected as the key targets at each of the monitoring sections (as numbered):

1 *Gallinago hardwickii* Japanese Snipe

2 *Emberiza schoeniclus* Reed Bunting *Gallinago hardwickii* Japanese Snipe
Luscinia akahige Japanese Robin

3 *Aegolius funereus* Tengmalm's Owl
Aix galericulata Mandarin Duck
Gallinago hardwickii Japanese Snipe
Glaucidium passerinum Pygmy Owl

4 *Aix galericulata* Mandarin Duck
Gallinago hardwickii Japanese Snipe

5 *Falcipennis falcipennis* Siberian Spruce Grouse
Falco subbuteo Hobby
Gallinago hardwickii Japanese Snipe
Pandion haliaetus Osprey

6 *Aegolius funereus* Tengmalm's Owl
Aix galericulata Mandarin Duck
Brachyramphus marmoratus Marbled Murrelet
Cygnopsis cygnoides Swan Goose
Falcipennis falcipennis Siberian Spruce Grouse
Haliaetus pelagicus Steller's Sea Eagle

7 *Aegolius funereus* Tengmalm's Owl
Brachyramphus marmoratus Marbled Murrelet
Falcipennis falcipennis Siberian Spruce Grouse
Glaucidium passerinum Pygmy Owl
Surnia ulula Hawk Owl

8 *Haliaetus pelagicus* Steller's Sea Eagle

Specific monitoring programmes have also been developed for the OPF and LNG sites to cover ornithological interests. The target species for monitoring at the LNG are Japanese snipe and common nesting species, although all birds are to be monitored within a 2km radius of the LNG plant (including migratory species observed during the survey period). At the OPF the target species for monitoring are Steller's sea eagle, white tailed sea eagle, Siberian spruce grouse, long billed murrelet and owls during the breeding season and all migratory birds during the autumn. Monitoring will be undertaken within a 500m zone of the boundary of the OPF and at control sites between 1-2km away from the OPF.

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Table 15.2. List of Sakhalin RDB birds providing details of their status, habitat requirements and occurrence in relation to Sakhalin II project activities. The list includes all of those species that have been regularly or recently recorded from Sakhalin Island (i.e. excluding the Kuril Islands) and other species included in the Russian-Japan Migratory Bird Treaty that are of potential conservation concern. RRDB = Russian Red Data Book; SRDB = Sakhalin Red Data Book; USSR-JAP.T = Birds listed in the Russian-Japan Migratory Bird Treaty and IUCN = Birds listed in the IUCN/Birdlife Asian Red Data Book.

Species	Conservation (Russian Red Data Book; Sakhalin RDB; USSR-Japan Treaty)				Status	Occurrence and general habitat requirements	Relevant survey information	Presence in relation to proposed project activities	Notes
	RRDB	SRDB	USSR-JAP T	IUCN					
Gavia adamsii White-billed diver					Rare migrant during spring and autumn. On passage during summer. Occ. overwinters	Recorded from the north-eastern coast, Terpeniya and Aniva bays. During summer migration occurs on coastal waters and lagoons. The flyways to the winter quarters in coastal waters of the Kuril Islands and Japan run southwards along the Sakhalin coast.	Not recorded during dedicated survey work.	May be present in coastal and lagoon waters close to facilities in the north-east (Piltun-Lunskoye and pipeline landfall areas) and LNG/TLU in Aniva Bay.	Population. Small. No specific data.

Species	Conservation (Russian Red Data Book; Sakhalin RDB; USSR-Japan Treaty)				Status	Occurrence and general habitat requirements	Relevant survey information	Presence in relation to proposed project activities	Notes
	RRDB	SRDB	USSR-JAP T	IUCN					
Tachybaptus ruficollis Little grebe					Migrant and rare breeding resident (?)	A rare species at the edge of its range in Sakhalin. The little grebe inhabits shallow fresh water basins with slow-running waters (small lakes, lagoons, peat excavations, water reservoirs, etc.) with rich riparian and aquatic vegetation. During autumn migration (October to late November) it can be found using ice-free lakes and shallow coastal waters. A small number of birds may overwinter. (e.g. Lebyazhye lake). The little grebe is regularly observed on shallow lakes in the Poronai valley during the autumn migration (it may well nest here as well) and on non freezing tributary sections of the Poronai river.	One bird recorded.	Could occur on the Poronai river and therefore in the vicinity of the pipeline crossing.	
Phoebastria albatrus Short-tailed albatross					Occasionally recorded on passage	Occasionally recorded off the northeastern coast of Sakhalin in spring and summer. The species was observed near Chaivo Bay in 1995.	Not recorded during dedicated survey work.	May pass through the area occupied by the Piltun-Lunskoye platforms.	
Phoebastria nigripes Black-footed albatross					Possibly very rare vagrant to marine waters off east Sakhalin	This species breeds on the north-western Hawaiian Islands and three outlying islands of Japan. The species disperses widely over the north Pacific, regularly reaching the Bering Sea and the Pacific coast of North America. May occur in limited numbers in the Okhotsk Sea where they remain mostly in the waters around the Kuril Islands.	Not recorded during dedicated survey work.	Highly unlikely to be encountered in marine/coastal areas where project activities occur.	

Species	Conservation (Russian Red Data Book; Sakhalin RDB; USSR-Japan Treaty)				Status	Occurrence and general habitat requirements	Relevant survey information	Presence in relation to proposed project activities	Notes
	RRDB	SRDB	USSR-JAP T	IUCN					
Diomedea immutabilis Laysan albatross					Possibly very rare vagrant to marine waters off east Sakhalin	The Laysan albatross breeds on islands in the mid-Pacific, especially islands in the Hawaiian chain. As with other albatross species it generally occurs in open oceanic waters far offshore. Using oceanic currents, they penetrate in limited numbers into the Okhotsk Sea where they remain mostly in the waters around the Kuril Islands.	Not recorded during dedicated survey work.	Highly unlikely to be encountered in marine/coastal areas where project activities occur.	
Puffinus tenuirostris Short-tailed shearwater					Common summer migrant to offshore waters	This species breeds in Australia and New Zealand, and migrates to the temperate waters of the northern hemisphere for molting and feeding during the southern winter (May-August). Large numbers (approximately 800,000) occur off the south-east coast of Sakhalin in shelf and deep water areas, particularly offshore of Terpeniya Bay and south Aniva Bay. Numbers are generally significantly lower off the north-east coast, but in some years aggregations of several shearwater species may occur.	Not recorded during dedicated survey work.	This species may occur in the vicinity of the platforms in north-east Sakhalin. Unlikely to be present in any significant numbers in nearshore waters of Aniva Bay.	

Species	Conservation (Russian Red Data Book; Sakhalin RDB; USSR-Japan Treaty)				Status	Occurrence and general habitat requirements	Relevant survey information	Presence in relation to proposed project activities	Notes
	RRDB	SRDB	USSR-JAP T	IUCN					
Puffinus griseus Sooty shearwater					Common summer migrant to offshore waters	This species breeds in Australia and New Zealand, and migrates to the temperate waters of the northern hemisphere for molting and feeding during the southern winter (May-August). Large numbers (approximately 800,000) occur off the south-east coast of Sakhalin in shelf and deep water areas, particularly offshore of Terpeniya Bay and south Aniva Bay. Numbers are generally significantly lower off the north-east coast, but in some years aggregations of several shearwater species may occur.		This species may occur in the vicinity of the platforms in north-east Sakhalin. Unlikely to be present in any significant numbers in nearshore waters of Aniva Bay.	
Puffinus bulleri Buller's shearwater					Possibly very rare vagrant to marine waters off east Sakhalin	Buller's Shearwaters nest only on the Poor Knights Islands, located off North Island, New ZealandTrans-equatorial migrants, Buller's Shearwaters head north to sub-arctic waters in April and May, where it may be found during the northern summer in oceanic areas. The Sea of Okhotsk is outside it's normal migratory area, and its occurrence in off Sakhalin is not known.	Not recorded during dedicated survey work.	Highly unlikely to be encountered in marine/coastal areas where project activities occur.	
Calonectris leucomelas Streaked shearwater					Rarely recorded on passage	Rarely recorded off the northeastern coast; observed in the Chaivo Bay area.	Not recorded during dedicated survey work.	May pass through the area occupied by the Piltun-Lunskoye platforms.	

Species	Conservation (Russian Red Data Book; Sakhalin RDB; USSR-Japan Treaty)				Status	Occurrence and general habitat requirements	Relevant survey information	Presence in relation to proposed project activities	Notes
	RRDB	SRDB	USSR-JAP T	IUCN					
Phalacrocorax capillatus Temminck's (Japanese) Cormorant					Nesting migratory and passage species	A coastal species largely restricted to southern Sakhalin. A small breeding population (50-60 pairs) occurs on the Aniva cape (Nechaev, 1991) and it probably also breeds on the Tonino-Anivsky Peninsula. During seasonal migrations and dispersal, groups of birds can be found in Terpeniya Bay and Aniva Bay, particularly on "Yunona Rocks" near Prigorodnoye village in Aniva Bay. Single birds and small flocks probably spend the winter in the ice-free waters of southern Sakhalin. During the autumn this species migrates to the coastal waters of the Kuril Islands and Japan.	Not recorded during dedicated survey work.	Occurs on passage and migration in Aniva Bay in proximity to the LNG facility at Prigorodnoye.	
Botaurus stellaris Eurasian bittern					Rare migrant, with a small breeding population (?)	Migrant species recorded in small numbers, mainly in southern Sakhalin. Inhabits the margins of lakes and ponds among emergent vegetation. May breed in suitable locations, but numbers not known.	Not recorded during dedicated survey work.	Unlikely to be present in areas where project activities are planned.	

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Ixobrychus eurhythmus Schrenk's (little) bittern					Spring and autumn migrant with small numbers of birds breeding on Sakhalin Island.	Resident in south-east Asia (Korea, Japan and East China), this species migrates to north-east Russia during the spring. On Sakhalin, small numbers of migrating birds arrive at their breeding sites in late May through to mid-June. It nests in open places in swamps, the banks of shallow lakes and wet meadows, where nests are formed on the ground in tall, thick grass. The status of the breeding population is not known, but it breeds in the Tym valley, in the vicinity of Novotroitskoye village and possibly in suitable habitat in the vicinity of Nabil Bay. During late August, birds migrate in small groups along river valleys to the coast.	Recorded on autumn migration in the vicinity of Sokol and in the valley of Tym river between Beloye village and Tymovskoye village (probably close to breeding areas). Found on the outskirts of Nabil bay: (1 to 3 birds recorded at one census point).	Breeding habitat for this species may occur in the vicinity of the pipeline route in Nabil Bay and adjoining coastal sections.	
Gorsachius goisagi Japanese night heron					Rare vagrant.	Recorded from southern Sakhalin (pre-1950). Largely restricted to Japan (Honshu).	Not recorded during surveys.	Not applicable.	
Bubulcus ibis Cattle egret					Rare vagrant.	Occasionally recorded from southern and eastern Sakhalin.	Not recorded during surveys	Not applicable.	

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Egretta alba Great egret					Rare vagrant.	Occasionally recorded from southern and eastern Sakhalin.	3 individuals recorded from a lake at Val, but outside of the pipeline corridor (FIRC 2000). Zykov & Nechaev (2000) make reference to 2 birds (egrets) sighted in the northern part of Aniva Bay (Salmon Bay) in May 1998.	Occasionally present in Aniva Bay in proximity to the LNG facilities at Prigorodnye.	
Egretta intermedia Intermediate egret					Vagrant	Recorded from southern Sakhalin, particularly from the south-east coast. Occasional birds occur during the summer. Breeds across south-east Asia and is present in Japan (Honshu and Shikoku).			
Egretta garzetta Little egret					Very rare vagrant	A couple of records from southern Sakhalin.	Not recorded during surveys	Not applicable	
Egretta eulophotes Chinese egret					Accidental visitor	A couple of records from southern Sakhalin. Main population occurs in south-east China, north Korea and Hong Kong.	Not recorded during surveys	Not applicable	
Ardea purpurea Purple heron					Accidental visitor.	Recorded from the coast around Terpeniya Bay.	Not recorded during surveys	Not applicable	

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Platalea leucorodia Eurasian spoonbill					Accidental visitor	Pre-1950 record.	Not recorded during surveys	Not applicable	
Ciconia boyciana Oriental white stork					Rare vagrant	Occasionally occurs during the summer. Mainly recorded from the south of the Island (e.g. Aniva Bay, Busse Lagoon).	Not recorded during surveys	Not applicable	
Ciconia nigra Black stork					Rare vagrant	Rare species on migration. Recorded from Chaivo Bay.	Not recorded during surveys	Not applicable	
Branta nigricans Brant goose					Rare migrant	Small number of records from the north east lagoons (Piltun) and south Sakhalin (Salmon Bay, Aniva Bay and Busse lagoon).	Not recorded during surveys	May be present in Aniva Bay in proximity to the LNG facilities at Prigorodnye. Could occur in the north-east lagoons close to OPF and pipeline landfall locations.	

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Anser erythropus Lesser White-fronted Goose					Rare migrant on passage	Spring and autumn migrant that is largely confined to the northern half of Sakhalin Island, although small flocks occasionally occur in the south (e.g. Aniva Bay). Birds arrive in northern Sakhalin from Kamchatka and the Okhotsk Sea coast. Crossing the Island from East to West they head further South to China by the valleys of the Amur and Ussouri rivers. A small number of birds fly to Japan to overwinter. Migrating birds on Sakhalin inhabit freshwater lakes on the northern plain and bays on the north-eastern and western coasts. Time and routes of migration. In spring - April-May, in the autumn – September - October. The routes to winter quarters, primarily in China, cross over mainland Russia.	Not recorded during surveys, although small flocks of migrating birds previously recorded from Piltun, Chaivo and Lunsky bays.	May be present in Aniva Bay during the spring in proximity to the LNG facilities at Prigorodnye. Could occur in the north-east lagoons close to OPF and pipeline landfall locations.	Population. Small. On the Schmidt peninsula (Northern Sakhalin) up to 500 birds were recorded in the second half of September 1982 (Eremin, Voronov,1984). A flock of 15 birds was recorded in Aniva Bay (Nechaev, 1991).

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Anser cygnoides Swan Goose					Rare breeding and migratory species.	Probably breeds (Nechaev 1991) in small numbers in northern Sakhalin on marshy areas near lakes and ponds in the basins of upstream sections of rivers flowing into the Okhotsk Sea (e.g. Val and Piltun) and other rivers, flowing into the Tatar strait. It is also suggested that small numbers may breed on the shoreline of Lunsky and Nabil Bays. During seasonal migrations geese may occur in the lagoons of the north-east coast, particularly Chaivo and Piltun and also further South in the valleys of the Tym and Poronai rivers, and Aniva Bay (usually just 2-3 birds). However, the breeding status is presently not clear (Poyarkov 2001). Birds that do nest in the northern part of the Island arrive on Sakhalin from the mainland. Routes to winter quarters cross the northern part of the Japanese Sea and the Taranay strait. Small numbers of birds winter in Japan.	A pair of this species was recorded on the bank of the Orkunii river during the monitoring work undertaken in 2003. This constituted the first record of the species in the corridor of the surface pipeline route and is also an important finding for the Island as a whole.	Survey data indicates that this species is present on the pipeline route (albeit at very low population levels). It may also occur in the north-east lagoons on migration.	The global population of this species is critically small and is reducing at a steady rate. Estimates indicate that the migratory population on Sakhalin is now only one tenth of what it was in the 1940-1950s. By the late 1970s its range on Sakhalin covered less than half of the area that it occupied in the 1920s and 1930s.

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Cygnus cygnus Whooper swan					Nesting migratory and transitory species	Breeds in northern Sakhalin on fringes of large lakes and bays (near Piltun, Chaivo and Baikal bays and Sladkoye lake), Muravyevskaya lowlands (Svobodnoye lake), and, probably in the valleys of Tym and Poronai rivers (Nechaev, 1991). During migration birds occur on the shallow parts of bays, on the sea coast near rocky or sandy beaches, on big lakes and rivers. The spring migration typically takes place between the third week of March and the first half of May. The autumn migration occurs between September and the first half of November. Migratory flyways to Japan cross and run down the Island.	Recorded in Aniva Bay (300) on spring migration during surveys in 2000. Small migratory flocks recorded on several occasions in spring 2003 along southern sections of pipeline route (AUCBB 2003).	Present in Aniva Bay on migration in proximity to the LNG facilities at Prigorodnye. Also occurs on migration in the north-east lagoons, potentially close to OPF and pipeline landfall locations.	The total breeding population is small and not likely to exceed 20-30 pairs. During migration large numbers of birds occur (e.g. estimate of 15,000 birds in Aniva Bay in spring 1992). The population has increased in the last 30 years, probably due to favourable conditions at its wintering grounds in Japan.

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Cygnus columbianus bewickii Bewick's swan					Migrant and overwinters in small numbers.	Migrating birds inhabit shallow waters of bays and large lakes. The most favoured sites on Sakhalin are Aniva Bay (Salmon Bay), Lebyazhye and Nevskoye lakes and the shallow lagoons of the north-east and west. Bewick's swan is a relatively common species on spring migration (e.g. in April 1992 at least 6000 birds were counted in mixed flocks with *Cygnus cygnus*, in Aniva Bay). Smaller flocks of birds, usually several hundreds, occur on the north-east lagoons in spring. During the autumn (October to the first half of November) the main migration route takes birds over Sakhalin Island and further southward. Large numbers of Bewick's build up at Piltun lagoon (7,000 - 10,000) in September, before migrating south during October.	Commonly recorded during autumn surveys undertaken in the north-east (e.g. FIRC 2001) when up to 10,000 birds were observed during survey work (Piltun and Chaivo). Recorded in Aniva Bay on spring migration during surveys in 2000.	Present in Aniva Bay on migration in proximity to the LNG facilities at Prigorodnye. Also occurs on migration in the north-east lagoons, potentially close to OPF and pipeline landfall locations.	Survey data clearly indicates that Bewick's swan uses the northern end of Piltun lagoon as a staging area during the autumn prior to completing migration further south. Smaller numbers (1,000-2,000) birds use the northern end of Chaivo, but there is very limited use of the other lagoons in the area. During the spring numbers using the lagoons vary considerably (from 2, 000-10,000) depending on the ice conditions (i.e. availability of open water).

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Anas poecilorhyncha Spot-billed duck					Migrant and Breeding (?) species.	Occasionally observed on migration on the lagoons of the north-east of the Island (e.g. Piltun 1990). It is suggested that this species may breed in small numbers on pond fringes in the north-east (Nechaev 2000). Also recorded on migration from Aniva Bay (the Salmon Bay). There is an old record (1906) for a nest being found close to the mouth of the Susuya River. Recent data suggests that the species is likely to be breeding in low numbers at suitable locations.	Two spot-billed ducks were recorded during the spring 2003 survey of the pipeline route in the vicinity of Lebyazhye Lake. It could not be determined if these represented local breeding birds or migrants.	Given only occasional presence and very low population levels on the Island, this species is unlikely to be regularly encountered in project areas.	
Anas formosa Baikal teal					Rare migrant	The Baikal Teal is only known to breed in eastern Russia and occurs on migration in the Russian Far East, Mongolia, Japan, North Korea, South Korea and northern China. The main breeding grounds are in the northern taiga and southern tundra in Yakutia, Chukotka, Magadan and Khabarovsk regions, and it occurs on migration in Khabarovsk, Amur, Primorye and Sakhalin regions. On Sakhalin it is recorded as a passage migrant in April-May and September-October (Nechaev 1991). There are pre 1940 records for Terpeniya bay, near Poronaysk, and Solov'yevka near Korsakov. One recent record from 2001 (see opposite).	One bird recorded during survey work in Nabilsky lagoon in autumn 2001 (FIRC 2001), this apparently being the first record since at least 1937.	Occurs on migration in the north-east lagoons, potentially close to OPF and pipeline landfall locations.	Unfortunately, the bird recorded from Nabilsky lagoon was accidentally shot by a hunter (the specimen is now in the Sakhalin Museum). However, local hunters indicate that this species occurs regularly and during the survey work in 2001 it was suggested that further birds were likely to be present at Nabilsky.
Polysticta stelleri Steller's eider					Rare migrant	The species is rare on migration in the coastal zone of northeastern Sakhalin. Previously recorded from Piltun Lagoon.	Not recorded during surveys.	Not applicable.	

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Aix galericulata Mandarin duck					Nesting and migratory species	This duck is a tree-nesting species inhabiting well-wooded (deciduous and mixed) river valleys. In Sakhalin this species is known to breed as far north as the Viakhtu river basin in the west and the Piltun river basin in the east. It is also recorded from the basins of the Tym, Poronai, Susuya and Mereya and other rivers. During migration it can be found on lakes, at river mouths and on the lagoons of the north-east. The breeding population of Sakhalin probably migrates to Japan for the winter.	During the breeding bird survey undertaken in 2003 at least 14 pairs were recorded from the 8 monitoring plots. Also recorded in 2000 during the pipeline survey (14 individuals; but not confirmed as breeding).	This species occurs in suitable wooded river valleys along the pipeline route, but particularly in the Lesnaya River valley and the Madera valley. It is also likely to be occasionally present on the north-east lagoons.	

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Pandion haliaetus Osprey					Nesting migratory and transient species	This species occurs sporadically over the whole Island, but in particular in coastal regions up to 20km from the sea, in river valleys and along the banks of the larger rivers. The total population on the Sakhalin Island, data 1985-1989, does not exceed 100 nesting couples (Nechaev, 1991). The highest density of birds is in the north-eastern coastal area and in the Terpenia Bay area. Spring migration occurs during March - the first half of April, with birds returning to their wintering quarters during September - October. The birds migrate by continental and island routes, usually along the sea coast.	This species has been recorded during surveys of the north-east lagoon system (e.g. one in Lunsky Bay in 2003) and the pipeline route. In 2000 migrating birds were observed in the vicinity of Sokol, Sovetskoye, and Buyukly and during the spring at Nysh. In 2003, hunting birds were regularly seen in the Lebyazhie Lake area and along rivers in the area of the Nysh re-routing section. No nests were found.	Osprey is likely to be present throughout the project area. No nesting sites have been located along the pipeline route, although this species feeds along river sections and in the lagoons of the north-east coast where project activities are occurring..	Breeding osprey often have extensive territories covering areas in excess of 20km from nesting sites. As a consequence, this species can be affected (e.g. impacts on food resources) by activities at some distance from its actual breeding sites. However, similarly, given its wide ranging habits such influences have to also be extensive in order to adversely affect this species.
Circus aeruginosus Marsh harrier					Rare migrant and possible breeding species	Several records of migrating birds, mainly from the south of the Island.	Not recorded during any of the dedicated survey work.	Not applicable.	

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Accipiter gularis Japanese (lesser) sparrow hawk					Rare migrant and breeding species	A rare nesting species, found in the southern and central areas of the Island as far north as Nysh. The status of the Sakhalin population is not known. It generally inhabits coniferous/birch and spruce/silver fir forests on mountain slopes and in river valleys and less frequently mixed forests and forests surrounding lakes and swamps. It nests in coniferous trees and preys mainly on small perching birds and rodents.	Recorded during survey work in August & September 2000 at Beloye and Buyukly and Sokol (caught in mist net). These were all migrant birds, but probably bred on the Island.	Likely to be present along the pipeline route and possibly the LNG site, but in low numbers.	
Aquila chrysaetos Golden eagle					Rare migrant	Isolated and old records from across Sakhalin Island.	Not recorded during any of the dedicated survey work.	Not applicable.	

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Haliaeetus albicilla White-tailed eagle					Nesting migratory transient and wintering species	This species occurs throughout the Island, although it is more frequently encountered in central regions than in the north or south. It inhabits the wooded valleys of the larger rivers (e.g. Tym and Poronai), the lagoons of the north-east coast and Terpenia and Aniva bays. The breeding population is small and probably comprises in the region of 100 pairs (data from 1983-1989; Nechaev 1991). There is a small wintering population, approximately 50 birds, which remains on the Island throughout the winter (e.g. non-freezing, upstream section of the Tym and the downstream section of the Pilenga river). Non-wintering birds leave the Island in October-November and migrate to wintering grounds in Japan via coastal routes. Birds return in March-April.	During the 2003 spring survey, this species was regularly encountered along the pipeline route, particularly in the north. However, no nesting sites were recorded although behavioural evidence suggested that at least two pairs were nesting in proximity to the pipeline (Lesnaya River and Dagi River). Eagles were also recorded during the surveys in 1999 and 2001.	White tailed eagle is likely to occur throughout the area covered by project activities, although particularly in the north. There is no record of nest sites being present on the pipeline route. Migrating and wintering birds may be present in Aniva Bay in proximity to the LNG facilities.	

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Haliaeetus pelagicus Steller's sea eagle					Nesting, migratory, transient and wintering species	This species is largely restricted to the coastal zone, particularly in the north-east of the Island where it frequents wooded river valleys, bays and inlets. Following surveys in the 1990s, Masterov (1998) estimated that there were 110 nesting pairs and 160 non-breeding birds on Sakhalin Island. The start of the breeding season depends on the conditions at the end of winter, but is typically late February/early March. During seasonal migrations this species can be found in southern regions of the island, prior to migration to northern Japan. A small number of birds overwinter on the island.	The breeding and migratory population of Steller's sea eagle has been the subject of a specific survey and monitoring programme, which has been in place since 1998.	Breeding Steller's sea eagle may be present in the vicinity of the OPF and the pipeline landfall at Piltun. All potential nests have been identified and specific mitigation measures implemented to ensure that disturbance to this species does not occur during project activities.	
Falco rusticolus Gyrfalcon					Rare migrant	Rarely observed during autumn migration. Recorded from across the Island. However, recent records (last 50 years) are very sparse.	Not recorded during any of the dedicated survey work.	Not applicable.	

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Falco peregrinus Peregrine falcon					Nesting migratory and transient species	During the breeding season this species can be found across the Island, although extremely irregularly and largely confined to the coast. It is positively proven that it nests on the Aniva and Kuznetsov capes (Krilyon peninsula), on the coast in Terpeniya bay and the Schmidt peninsula and in several other regions. During migration, birds can also be found at other coastal locations and in more inland areas. Migrates during April-May and September – October.	Peregrines were observed on a number of occasions during the autumn migration surveys of the north-east lagoons in 2001. A single bird was also recorded in late August 2000 near to the coast in the vicinity of Sovetskoye village	Likely to present in the vicinity of the pipeline landfall sites in the north-east and possibly along the pipeline route in proximity to the coast.	The size of the Sakhalin population is unknown, although it is likely to be small.

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Falco subbuteo Hobby					Breeding and migrant species.	This is a widespread but generally uncommon species. It inhabits forests of various formations, most often on the outskirts of sparse coniferous and mixed forests as well as overgrown felled areas, older burn sites and farmland. It is a tree nesting species using the old nests of other birds of prey and crows or suitable holes. Migrant birds are encountered during April-May and September-October. species	In the 2003 pipeline survey adult birds were recorded at 4 locations and three breeding territories were assumed to be present at the sections examined along the pipeline route (Kirpichnaya river, neighbourhood of tNovotymovskoye and at 30–44 km of the Nysh re-route). This species was also recorded during the 1999 survey at Beloye, Bukukly, Nysh and Val.	Breeding birds are likely to occur throughout the area covered by project activities, although particularly in central and southern regions. Although actual nesting sites have not been recorded the species is likely to be nesting along the pipeline corridor.	

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Dendragapus (Falcipennis) falcipennis Siberian grouse					Resident species	This ground-nesting species inhabits mountain slope and plain spruce forests. In the spring when snow cover reduces, birds move to forest fringes, clearings and sparse growth mixed larch and spruce forests, often in boggy areas, and mixed spruce-birch forests. It is present in low numbers throughout northern and central regions of Sakhalin Island as far south as Nevskoye lake and Terpeniya Bay.	Observational data indicates that this species is present at a number of locations along the northern and central sections of the pipeline route. The 1999 survey revealed its presence in the Nysh area. The 2003 survey recorded a nest and indirect signs (droppings and feathers) along the northern section of the pipeline.	Siberian grouse is present along the northern section of the pipeline route. This is a sedentary species with a high degree of site fidelity. Males hold breeding territories and as such this species may be vulnerable to the loss of these sites where they occur along the pipeline route or potential zone of disturbance.	This species was rare on Sakhalin even in the middle of the 19th century (Gizenko, 1955). The available survey data indicates that the afforested terrain from the Nabilsky ridge foothills to the coast of the Lunsky and Nabilsky bays is one of the most important places for maintaining the population of Siberian Spruce Grouse on Sakhalin Island.

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Tetrao urogalloides (parvirostris) Black-billed capercaille					Resident species	Present in northern and central areas of the island. Inhabits water-logged to dry sparse larch forests and overgrown felling/fire sites.	A group of three birds (one female and young) were recorded during the survey in 2000 from the Nabilsky ridge in the north of the Island. A poll of hunters also confirmed the presence of this species in the area.	Likely to be present in the vicinity of the pipeline route in the north of the Island (Nabilsky, northwards) and possibly further south.	The males of this species form permanent lekking areas (where the males congregate prior to breeding). The loss of such an area could have a significant and adverse impact upon local populations.
Coturnix japonica Japanese quail					Resident	Restricted to the central and southern regions of the Island. A rare breeding bird of agricultural meadows and pasture.	Recorded twice from farmland during 2000 in the vicinity of the village of Novotroitskoye (central Sakhalin) and Tymovskoye, north of Dolinsk.	This species may be present in suitable habitat in the vicinity of the pipeline route..	
Grus japonensis Japanese crane					Very rare vagrant	Four-five old records (pre 1935) of migrant birds from south-west Sakhalin (Gornozavodsk).	Not recorded during surveys	Not applicable	

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Grus leucogeranus Siberian crane					Very rare vagrant	Breeds in Russia and overwinters in China, India and Iran. There are old records of occasional birds appearing in Sakhalin during migration.	Not recorded during surveys	Not applicable	
Grus vipio White naped crane					Very rare vagrant	Three birds recorded from Losos' inlet, Aniva bay, in May 1979 (Nechaev 1991).	Not recorded during surveys	Not applicable	
Grus monacha Hooded crane					Breeding (?)	The south –east boundary of the breeding range of this species is located in Primorskiy Krai, opposite Sakhalin. Here it inhabits peatmoss-larch forests at an altitude of 200-600m above sea level, a habitat that is common on Sakhalin. However, nesting of this species on the Island has not been confirmed, although it is possible that some pairs nest in the central areas of the island (Surmach et. al. 2000). This crane migrates from its breeding grounds to wintering areas in south Japan, China and South Korea.	Four birds were recorded near Vzmorye (south of Makarov) in a meadow in late September 2000. This site was located away from the pipeline route.	Not recorded from the pipeline route and potential breeding locations unknown.	
Porzana pusilla Baillon's crake					Resident	Distributed across the Island, this relatively rare breeding species is seldom encountered due to its elusive habits. An inhabitant of sedgy swamps and wet/flooded meadows.	Not recorded during dedicated survey work.	Possibly present in wetland areas along the route of the pipeline, particularly in the central and southern regions of the Island.	

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Porzana fusca Ruddy breasted crake					Rare migrant and breeding species (?)	A very rare migrant, recorded from the Aniva Bay area. It may possibly breed in suitable locations (swamps and margins of ponds and lakes).	Not recorded during survey work.	Not applicable.	
Gallinula chloropus Moorhen					Rare migrant and breeding species	Recorded from southern and central Sakhalin. A rare breeding species of wetlands, inhabiting margins of ponds and lakes.	FESU (2000) make mention of this as a breeding species, but present outside of the 4km envelope of the pipeline route.	Maybe present in the vicinity of the pipeline but as it inhabits the margins of areas of open water, this species would not be affected by project activities.	
Gallicrex cinerea Water cock					Very rare vagrant	This wetland species breeds on the Korean peninsula, the south of the north-east China and the extreme south of Japan. It has been recorded sporadically and in low numbers from southern Sakhalin Island.	A single bird close to Prigorodnoye village was recorded in August 2000.	Not applicable.	
Fulica atra Coot					Rare migrant and breeding species	Recorded mainly from southern and central Sakhalin. A rare breeding species of wetlands, inhabiting margins of ponds and lakes.	FESU (2000) make mention of this as a breeding species, but present outside of the 4km envelope of the pipeline route	Maybe present in the vicinity of the pipeline but as it inhabits the margins of areas of open water, this species would not be affected by project activities.	

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	RRDB	SRDB	USSR-JAP T	IUCN					
Charadrius alexandrinus Kentish plover					Very rare breeding species	This is a coastal species which breeds in sand dunes, saltmarsh and salt pans. A couple of records from the far south of Sakhalin Island probably of migratory birds that may have bred locally.	Not recorded during dedicated survey work.	Not applicable	
Himantopus himantopus Black winged stilt					Very rare vagrant	A few records from coastal areas of southern and central Sakhalin.	Two birds recorded from marshland pools on the fringe of Nabilsky Lagoon in June 2003.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas.	
Haematopus ostralegus (osculans) Eurasian oystercatcher					Migrant	Observed in small (and notably reducing) numbers using the lagoon system of the northeastern coast during migration, mainly during the autumn.	Not recorded during dedicated survey work. Zykov et.al. (1999) mention a flock of 60 birds observed in Lunsky Bay in September 1990 and 4 birds seen in Dagi Bay in October 1998.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas.	

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Tringa ochropus Green sandpiper					A rare breeding and migratory species	Probably breeds in small numbers across much of the Island. Inhabits areas of small streams, ditches, pools and moist muddy corners of larger water bodies. Probably present as a breeding species in the lowland areas of the Tym and Poronai. Generally absent from coastal and tidal habitats.	Several birds were recorded on migration in the vicinity of Sokol during migratory studies (September 2000) and one individual by the Pilenga river.	Potentially, may occur in wet, sparsely wooded areas along the pipeline route.	
Tringa guttifer Nordmann's (Spotted) Greenshank					Rare breeding and migratory species	This rare breeding species inhabits areas with damp coastal meadows and in sparse boggy larch forests near the seashore or further inland, in places with brackish and freshwater ponds, lakes, ditches, shallow coastal lagoons and wide muddy channels (Nechaev 1991). It nests on the edge of the larch stands and in the vicinity of lakes and bogs, sometimes as far as 10km inland, and feeds on the muddy shores of tidal lagoons or shallow lakes (Nechaev 1991). Small breeding colonies (up to 10 pairs) are known to occur in Nabilsky, Dagi and Chaivo bays and it is also probably present at Piltun and Lunsky bays. During seasonal migrations (second half of May – first week of June and early August-September) birds can be observed in small groups feeding over intertidal areas in the Bays. The Sakhalin population of spotted greenshank overwinters in south-east Asia.	Breeding birds recorded at mouth of Dagi River (Nyisky Lagoon) during 2000 survey of north-eastern lagoons. A breeding colony of this species was recorded from the northern end of Chaivo Bay during survey work (2004) for the alternative pipeline re-route option analysis.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF.	This is one of the World's rarest birds with a total global population probably in the order of 500-1000 birds. It only breeds in eastern Russia and it is likely that Sakhalin holds a significant proportion of the breeding population (approx. 10%), although data from across its breeding range is limited.

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Tringa stagnatilis Marsh sandpiper					Very rare vagrant	Frequents freshwater pools and marshes. A couple of records from the extreme south of the Island.	Not recorded during dedicated survey work.	Not applicable	
Phalaropus lobatus Red-necked phalarope					Rare breeding species. Relatively common on migration	Small breeding population in the north-east of the Island where it inhabits sparsely wooded, boggy areas (recorded from Larvo Island, Nabilsky Bay, Piltun and Chaivo). Migrates along the shores of north-east Sakhalin, stopping over for resting and feeding on the sea and sometimes forming small flocks.	Recorded on migration during surveys of the north-eastern lagoons in 2001.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF.	
Philomachus pugnax Ruff					Rare breeding and migrant species	Small breeding population present in the north-east of the Island where it inhabits open, wetland areas close to the coast. It is known to breed in the southern part of Nabilsky Bay in wetland habitat at the mouth of the Orkkunya River.	Recorded on migration during surveys of the north-eastern lagoons in 2001.	May be present in very small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF.	

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Eurynorhynchus pygmeus Spoon-billed sandpiper					Rare migrant	The Spoon-billed Sandpiper breeds on the Chukotsk peninsula and southwards down the isthmus of the Kamchatka peninsula, in north-eastern Russia. During migration it follows the coastline of east Sakhalin on its way to breeding grounds and wintering grounds in south-east and south Asia. Usually observed in small flocks of 5-30 birds feeding in intertidal areas of lagoons and open coast in the north-east, tending to prefer more sandy substrates.	Recorded on migration during surveys of the north-eastern lagoons in 2000 (3 birds at Nyisky Bay and 1 bird in Lunsky Bay).	May be present in very small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF	Up to 200 birds recorded on migration in Aniva Bay (1979). Flocks of this size have not been observed since the 1970s. Global population estimated at less than 5000 birds.
Calidris subminuta Long-toed stint					Rare breeding species. Common migrant	Small breeding population present in the north of the Island. Nechaev (1991) indicates that it breeds in boggy areas in sparse larch woods around the fringes of the north-east lagoons. No apparent data on total breeding population, but figures of 10-30 pairs are provided for most of the lagoons. Relatively common on migration, with birds being regularly seen in Aniva Bay and the north-eastern lagoons in the spring (late May) and on return during the autumn (September-October).	Recorded during surveys of the bays in 2000 and 2001 (8 Nyisky (autumn), 20 Nabilsky (autumn) 10 Lunsky (autumn) 40 in Aniva Bay 2000 (spring). Busse lagoon in autumn 2001). Recorded as a breeding species in Chaivo, Lunsky and Nabilsky bays during survey work in spring 2003.	May be present in very small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF. Also present in Aniva Bay in proximity to the LNG facilities at Prigorodnoye on migration.	

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Calidris ferruginea Curlew sandpiper					Rare migrant	Rarely observed migrant on passage, mainly in the north-east of the Island during the autumn and Aniva Bay on spring migration.	1 recorded from Piltun Bay during autumn survey in 2000. Regularly recorded from Aniva Bay during spring migration (flocks of up to 150-200 birds in the Salmon Bay and at Busse lagoon).	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF. Also present in Aniva Bay in proximity to the LNG facilities at Prigorodnoye.	

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Calidris alpina (actites) Dunlin (Sakhalin subspecies)					Breeding and migratory species	Subspecies of dunlin restricted to Sakhalin. Present only in the north-east of the Island where it inhabits the coastal fringe around the bays and islands. Nests in wetland areas where marsh vegetation (sedge, moss) predominates around shallow pools. Forms small breeding colonies in suitable locations. Breeding sites confirmed on the coast and islands of the Nabilsky, Dagi and Chaivo bays, and on the Piltun Neck (Nechaev, 1991). On migration, has been observed in the southern part of the Island in Aniva bay (Nechaev, 1991). Spring migration second half of May - beginning of June; summer and autumn - July - October. Overwinters in south Asia (?).	Lagoon survey in 2000 recorded 12 pairs nesting in Nabilsky lagoon. Survey in 2003 recorded 6-10 pairs in the southern part of Chaivo Bay. In total 15 pairs recorded from the north-east lagoons (Piltun, Chaivo and Nabilsky). 6-10 pairs recorded at the southern end of Chaivo Bay and 4 pairs in Nabilsky Bay (Lagoons survey, 2003). Breeding colony of 5-7 pairs also recorded during 2004 survey along alternative pipeline route at northern end of Chaivo Bay	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas.	No data available on the total breeding population present on Sakhalin. However, it is likely that it is less than a hundred pairs. In 1987, on a 6km^2 area on the Piltun lagoon neck, about 30 pairs of birds were recorded

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Calidris acuminata Sharp-tailed sandpiper					Rare migrant	Regular migrant in small numbers to the north-east coast and Aniva Bay.	Migrating birds recorded in spring 2003 survey from area close to Lebyazhie Lake (5 birds) and 2 birds passing through near to Nysh. Nabilsky Bay – 10 birds recorded during September 2001 and I bird from Niysky Bay in 2000.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF. Also present in Aniva Bay in proximity to the LNG facilities at Prigorodnoye.	
Limicola falcinellus Broad-billed sandpiper					Rare migrant	A rare migratory species. Recorded from the north-east coast where it feeds in the intertidal areas of the lagoon systems and roosts in meadows near outfalls of streams and rivers. Also recorded from Aniva Bay. Usually observed on autumn migration during September.	A total of 5 birds recorded from Piltun, Niysky Bay and Lunsky Bay during 2000. Busse Lagoon – 2 birds in October 2001.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF. Also present in Aniva Bay in proximity to the LNG facilities at Prigorodnoye.	

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Gallinago hardwickii Latham's (Japanese) snipe					Breeding and migratory species	A relatively common breeding species that is present in southern and central areas of Sakhalin Island, northward to the Uglegorsk river valley, Shakhtersk on the Western coast, and Poronai river valley in the east (Nechaev, 1991). Nests in marshes and meadows in river valleys and fringes of lakes and mixed grass meadows on gentle, forest-free hill slopes. On migration, this species is most often found in marshes, by lakes and banks of rivers on the coastal plain. Arrives on the Island in second half of April and first half of May and leaves for winter quarters August-September. Overwinters in Australia and southern Asia.	Recorded on pipeline survey in 2000 in small numbers. The 2003 pipeline breeding bird survey estimated at least 120 pairs of this species were present along the southernmost recording section (4km) along the route and 160 pairs along the second survey section (Makarovsky). In total 350 pairs present at surveyed sections, including breeding birds 35km north of previous records in the Nabil Valley.	This species is present in relatively high numbers along the route of the pipeline, particularly along southern and central sections. Also present in the area of the LNG site.	First recorded as a breeding species in 1962, Japanese snipe has undergone a rapid expansion in range and numbers across Sakhalin Island over the past couple of decades. In the 1980's it was estimated that the total population in southern Sakhalin (to the latitude of Yuzhno-Sakhalinsk), was at least 500 pairs. Over the past 15 years there has been a steady expansion (by approx. 300km) of this species into central and northern regions of the Island.
Gallinago solitaria Solitary snipe					Rare migrant and wintering species.	Rare wintering species inhabiting areas along non-freezing mountain rivers. Recorded from across the Island, but particularly the central ridge. Also occasionally observed on migration.	Not recorded during dedicated survey work.	Possibly present along the pipeline route at suitable locations. .	

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Numenius minutus Little whimbrel					Very rare migrant.	A couple of old records from the west and north-west coast. Not recorded as a breeding bird.	Not recorded during dedicated survey work.	Not applicable.	
Numenius madagascariensis Australian curlew					Rare migrant on passage.	Occurs on passage during spring and autumn migration along the north-eastern coast and in Aniva Bay. Usually present in small flocks of 5 to 200 birds in the autumn (less in the spring). On migration middle April-first half of May and then middle July - September. Overwinters in Australia and south-east Asia.	One bird recorded in 2003 on spring migration in the Listvennitsa Valley in Dolinsky region. 2 birds in Niysky bay (autumn 2001) and 1 bird in Nabilsky Bay. A few birds also observed in Aniva Bay (Salmon Bay) in autumn 2001.	May be present in small numbers in the lagoons of the north-east in proximity to the pipeline landfall areas and OPF. Also present in Aniva Bay in proximity to the LNG facilities at Prigorodnoye.	
Larus glaucescens Glaucous winged gull					Rare migrant and wintering (?) species	About 2,000 individuals nest in Russia. In general, this species is abundant in the north Pacific, and its numbers may be as high as 500,000 individuals in the North American part of its range. Sakhalin Island waters form a western periphery of the area where small numbers winter and it is recorded occasionally from the east coast.	Not recorded during dedicated survey work.	Not applicable.	

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Rhodostethia rosea Ross's gull					Transient and wintering species	Main breeding areas are located in tundra of eastern Siberia, and the total world population may be as high as 150,000 individuals. Occurs in the waters of Sakhalin Island during winter (Nov-Apr) when ice is present, and sometimes becomes quite common. Sakhalin Island forms a south-western periphery of the area where Ross's Gulls winter. Estimated population of 1,000-1,500 birds in the Sakhalin area (LGL 1996).	Not recorded during dedicated survey work.	Not applicable.	
Pagophila eburnea Ivory gull						Nests mainly on Arctic islands. The world population may be as high as 100,000 individuals (Nechaev 1991). Occurs in the waters of Sakhalin Island in small numbers only in winter. This region forms a southwestern periphery of the wintering area of Ivory Gulls.	Not recorded during dedicated survey work.	Highly unlikely to be encountered in marine/coastal areas where project activities occur.	
Sterna paradisaea Arctic tern					Rare breeding and migrant species.	Occasional migrant. Nests in very small numbers (2-3 pairs) in the Terpenyia Bay area.	Not recorded during dedicated survey work.	Not applicable.	

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Sterna aleutica Aleutian tern					Breeding and migratory species	A relatively common breeding species present in Aniva bay, Lebyazhye lake, Terpeniya and the north-eastern lagoons. On the north-eastern coast, the Aleutian tern forms diffuse breeding colonies on the low islands situated in the lagoons and in areas close to river mouths within the lagoon systems. May also be present in hummock mossy marshes on the outskirts of thin larch forests. During migration birds can be found on the coast, primarily around the north-east lagoons. In spring, birds arrive in early May, with the main peak in mid-May. Terns probably leave the Island in the second half of September. Overwinters in the northern Pacific region and has been recorded from southern China.	Recorded regularly from the north-east lagoons during migratory studies. The lagoon survey of 2003 recorded 13,200 individuals with the majority being present at Piltun, Niisky and Nabilisky. This figure is significantly higher than previously recorded population levels.	Suitable breeding habitat not present along the pipeline route, except in the far north-east at the landfall areas and potentially at the OPF and BLF.	The biggest colonies on the Sakhalin Island are on the north-eastern coast: on the Larvo island in the northern part of Dagi bay and on Chaika island in Nabilsky bay. The total population in Sakhalin Island was estimated at approx. 2,300 pairs (data 1984-1985), concentrated in the Nabilsky-Piltun area (Nechaev, 1991). However, the latest survey data suggests that the population may be significantly higher.
Sterna albifrons Little tern					Very rare vagrant	Single record from Aniva Bay.	Not recorded during dedicated survey work.	Not applicable.	
Synthliboramphus wumizusume Japanese murrelet					Very rare vagrant	This species nests on islands offshore southern Japan. Nechaev (1991) reports two records from the southern part of Sakhalin. Occasional birds may occur in coastal waters around southern Sakhalin as far north as Terpeniya Bay.	Not recorded during dedicated survey work.	Highly unlikely to be encountered in marine/coastal areas where project activities occur.	

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Brachyramphus perdix Long-billed murrelet					Breeding and migratory species	*Brachyramphus perdix* breeds in Japan through the Sea of Okhotsk to the Kamchatka peninsula, Russia. It was split from the Marbled Murrelet *B. marmoratus* (which breeds in California to the Aleutian Islands) in 1996. The population is estimated to number in the tens of thousands. Apart from northern Japan, almost the whole breeding range is located in far eastern Russia. A considerable part of its life is spent at sea, but it comes ashore to nest during June-August. This species nests in trees in coastal coniferous and mixed forests and in forests up to 40 km from the shoreline. The only nest so far found in Sakhalin (June, 1976) was located at the top of a broken larch situated 2 km from Chaivo bay Nechayev, 1991). The bird is more easily encountered during July-August when adults are active in feeding young. Survey data indicates that it is present in the upstream parts of the Tym valley, and is observed regularly in the Nabilsky Bay and Lunsky Bay area.	Recorded in reasonable numbers (up to 120 individuals over two day counts) during survey work in August-September 2001 from the Nabilsky-Lunsky area. Also recorded in smaller numbers during spring surveys in 2003 in the same area.	This species is present in the vicinity of the pipeline route in the north of the Island. Although it has not been confirmed, breeding sites for this species could be present along the route of the pipeline.	

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Sphenurus sieboldii Japanese green pigeon					Rare vagrant and breeding species	This species is relatively common in Japan and is occasionally recorded from Sakhalin, where it is found in mixed coniferous –Erman's birch forests on hill slopes in the south of the Island.	Recorded on August 4th in the vicinity of Sovetskoye village and a young bird on October 15th at Sokol (2001). A single bird also recorded from the Makarovsky Reserve (Malakhitovka River) on June 22nd 2003.	Potentially present along the pipeline route in the south of the Island where this passes through mixed woodlands/forest.	Recent records suggest that this species is on the increase and although breeding has not been confirmed it is likely that this is a breeding bird in southern Sakhalin.
Nyctea scandiaca Snowy owl						Observed rarely on passage and during migration.	Not recorded during dedicated survey work.	Not applicable.	
Bubo bubo Eagle owl					Rare breeding species	Occurs over Sakhalin Island, but extremely irregularly. Recorded from Krilyon peninsula, Susunaisky mountain range, on the coast of the Tunaicha and Nevskoye lakes, in the valleys of the Tym and Poronai rivers, near Alexandrovsk and north-eastern coast of the island (Nechaev, 1991). Inhabits coniferous and mixed forests on mountain slopes, plains and the coast often where surface rock outcrops are present. Recorded from the Makarovsky Reserve (Araks River valley) in 2001. Interviews with local hunters also suggest that it is present in the valley of the Poronai River.	Probably present in the Lesnaya River valley in central Sakhalin (AUCBB 2003). A moult feather of this species was found 10km south of Piltun Bay close to the pipeline route (Surmach et. al. 2000).	Maybe present in the vicinity of the pipeline route, where habitat conditions are suitable (e.g. rock outcrops in wooded valleys), although such conditions are rarely present.	

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Ketupa blakistoni Blakiston's fish owl					Possible breeding species (?)	Recorded from southern and central Sakhalin, but no post 1950 records. Its status on the Island is therefore unknown. Has been recorded from the Krilyon peninsula, on the north-eastern coast (river valleys of the Naiba, Makarovka, Lasovaya and Tym rivers) and, possibly, on other rivers of the Island (Nechaev, 1991). It inhabits mountain river valleys, forested mountain slopes as well as forested lowlands and plains. Requires non-freezing, unpolluted rivers for feeding during the winter months, good populations of resident and migratory fish and large trees with suitable nesting hollows. May also feed on small mammals and birds during the winter.	Not recorded during dedicated survey work for the project.	Maybe present in the vicinity of the pipeline route, where habitat conditions are suitable (see comments opposite).	Although not recorded during surveys, evidence gained from questioning local hunters suggests that Blakiston's fish owl may possibly be present, albeit at very low population levels in the Tym river valley north of Yasnoye village and the middle and up-stream sections of the Nabil river. A feather of this species was found close to the Araks River in 1998.
Otus sunia Oriental scops owl					Very rare breeding species	This forest owl has only been recorded only from the Krilyon Cape. Present here at the northern edge of its range.	Not recorded during dedicated survey work for the project	Not applicable.	
Otus bakkamoena Indian scops owl					Very rare breeding species	This forest owl has only been recorded only from the Krilyon Cape. Present here at the northern edge of its range.	Not recorded during dedicated survey work for the project	Not applicable.	

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Aegolius funereus Tengmalm's owl					Breeding species	Recorded sporadically, but widely across the Island, mainly from central and southern regions. This species of owl inhabits dark coniferous forest and mixed forests on hill slopes and in valleys.	Recorded during the spring 2003 breeding bird survey (at least five pairs), from Lesnaya River valley and the Nabil River Valley. Previously only one recorded in 2001 in a field near the Pukhovaya River (nr Sovetskoye).	Present in the vicinity of the pipeline route, but apparently mainly confined to areas supporting dark coniferous forest.	Tengmalm's owl is probably more common and widespread than previous records suggest (e.g.data from the spring survey in 2003).
Glaucidium passerinum Eurasian pygmy owl					Breeding species.	Survey data suggests that this is a relatively rare breeding species that occupies similar habitats to that of Tengmalm's owl.	At least three breeding pairs were recorded during the spring 2003 survey along the pipeline route. Previously only recorded once from the valley of the Zvanka river, near Makarovsky (Surmach et. al. 2000).	Present, in very low numbers, in the vicinity of the pipeline route, but apparently mainly confined to areas supporting dark coniferous forest.	

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Surnia ulula Northern hawk owl					Breeding and wintering species.	The northern hawk owl is present mainly in central and northern Sakhalin where it inhabits areas of sparse coniferous forest (larch). Feeds on small rodents and may undertake significant movements at times when prey numbers become significantly reduced. Nesting takes place in old, enlarged woodpecker holes in the tops or hollows of tree stumps.	Recorded during the 2000 survey from the Vazi River valley area (west of Nabilsky lagoon). At least 2 breeding pairs confirmed from the same area during the 2003 breeding bird survey.	This species is present in the vicinity of the northern section of the pipeline route (Nabilsky area). Unlikely to be present further to the south.	
Strix nebulosa Great grey owl					Breeding and wintering species	Occurs at low population levels mainly in the north and central regions of the Island, where it inhabits denser coniferous forests with clearings.	Not recorded during dedicated survey work, probably due to early appearance of this species (April) and relatively secretive habits.	May be present in the vicinity of the pipeline route in the north (Nabilsky-Piltun area).	
Sturnia philippensis Red-cheeked starling					Rare breeding and migratory species.	A small breeding population of this species occurs in the south of the Island on the Krilyon and Aniva capes and also possibly in the region of Lake Lebyazhie. Occurs at the northern edge of its range and is more typical species of Japan and south Korea.	Not recorded during dedicated survey work.	Not applicable.	

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Bombycilla japonica Japanese waxwing					Rare breeding and migratory species.	A species characterized by a localized distribution and small population. Breeds only in the far east of Russia, where it has been found nesting in eastern Yakutia, Khabarovsk and Amur and Sakhalin (see opposite), in coniferous forests among larch and cedar trees It is a non-breeding visitor to Japan, where it is uncommon and sporadic. The overall population on Sakhalin is unknown, but is expected to be small.	Confirmed as a breeding bird on Sakhalin during project survey work undertaken in 2001, where two pairs with young were found along the Nogliksky section of the pipeline.	May be present in the vicinity of the pipeline route in the north (Noglisky), but in very low numbers.	
Prunella rubida Japanese accentor					Breeding and migratory species.	A rare breeding species typical of tall herbaceous vegetation. Recorded mainly from the central regions of the Island. it. Usually more commonly encountered during migration.	Not recorded from the pipeline route or facility sites. But, 10 individuals recorded during autumn migration studies in 2000 in meadow habitats in the vicinity of Buyukly village.	Unlikely to occur in habitats present along the pipeline route or at the LNG and OPF facilities.	
Monticola solitarus Blue rock thrush					Rare breeding species	Small breeding population present in the south of the Island. Recorded from Krilyon and Aniva capes. Spring migration end of April to beginning of May; autumn migration September-October.	Not recorded during dedicated survey work.	Not applicable.	

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Luscinia akahige Japanese robin					Rare breeding species.	*L. akahige* inhabits dark coniferous and mixed forests in mountainous areas where there are clearings (e.g. as caused by fire or felling). The species has only recently (since mid 20th Century) moved into Sakhalin, in association with human forest clearance. The birds prefer to inhabit narrow mountain river valleys littered with fallen trees. Inhabits southern Sakhalin and has not been recorded north of the Firsovka River.	The pipeline breeding bird monitoring survey (2003) recorded at least 55 pairs of Japanese Robin along the monitored section in the vicinity of the Izubrovy Reserve. Six birds recorded during migration studies (2000) at the Sokol bird observatory. One bird recorded from close to Vzmorie village (in the vicinity of the pipeline route, FESU 2002).	Present along the southern section of the pipeline route, particularly in the Izubrovy area.	
Zosterops japonica Japanese white eye					Very rare vagrant	Recorded from the Krilyon Cape in the far south-west of Sakhalin.	Not recorded during dedicated project surveys.	Not applicable.	

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Passer rutilans Russet sparrow					Rare breeding species.	Uncommon breeding species which inhabits the edge of sparse larch and mixed forests near built-up areas and farmlands. It prefers valley forests, where woodpeckers are present as it nests in old holes left by these species. Recorded as far north as Nogliki.	Both young and adult birds recorded in small numbers during surveys of the pipeline route and construction sites in 2000 and 2001 (Sovetskoye, Tymovskoye and Nogliki). One pair recorded in 2003 from Kirpichnaya valley (Dolinsk Region).	Present along the pipeline route and close to some construction sites where situated adjacent to settlements.	

Species	Conservation (Russian Red Data Book; Sakhalin RDB; USSR-Japan Treaty)				Status	Occurrence and general habitat requirements	Relevant survey information	Presence in relation to proposed project activities	Notes
	RRDB	SRDB	USSR-JAP T	IUCN					
Emberiza schoeniclus Reed bunting					Breeding and migratory species	A widespread breeding species on Sakhalin Island although the overall population is small. Inhabits reedbeds around lakes, ponds and at the coast. In suitable locations the breeding density may be quite high as the species often forms colonies.	A colony of this species is present at Lebyazhie Lake, part of which (approx. 8-10 pairs) falls within the 4km pipeline corridor (ACBB 2003). 1-2 pairs present in the reedbed surrounding Mereya Lake, on the western border of the LNG construction site (Fauna 2001). Also present adjacent to OPF site (FESU 2002).	Present within the pipeline corridor, but unlikely to be influenced by construction activity. Breeds adjacent to the LNG site and adjacent to OPF but outside of the direct areas of construction.	