Chapter 4 Baseline Steller's Sea-Eagle

4.1 INTRODUCTION

During the review of environmental documentation for the Sakhalin II development, the stakeholders to the project outlined a number of concerns and items requiring clarification as a result of reviewing the international-style Environmental Impact Assessment (EIA) report (SEIC 2003). In brief, the focus of the questions raised by interested parties regarding Steller's sea eagles included the following points:

- Clarification regarding the numbers of nesting sites identified during survey work;
- Provision of information on the various surveys that were undertaken (*e.g.* methodologies used, geographical areas covered, *etc*.);
- Detail on the Steller's Sea-Eagle Research Programme (*e.g.* timescales, responsibilities, *etc*.);
- Background to the selection of buffer zones along pipeline right-of-way (ROW).

4.2 BACKGROUND – PRESENCE AND ABUNDANCE

Steller's sea-eagle (*Haliaeetus pelagicus*) is the largest of eight species of sea and fish eagles in the genus *Haliaeetus*. In terms of overall distribution, it occurs only in eastern Asia, breeding in eastern Russia and wintering mainly there and northern Japan. Small numbers of *H. pelagicus* have been recorded in winter in North Korea, South Korea and north-east China (Birdlife International 2001).

The entire population of this species nests near to the coast of eastern Russia mainly on the Kamchatka peninsula (Koryakia and Kamchatka) and in Magadan and Khabarovsk (on the coast and islands of the Sea of Okhotsk and Bering Sea coasts as well as large inland lakes along the lower Amur south into the Gorin River). Smaller numbers nest in Chukotka and on the north of Sakhalin Island, the Shantar Islands and at least some of the Kuril Islands.

Its breeding range is mainly around the coasts of the Sea of Okhotsk but some breed in the lower Amur River drainage (*ibid.)*.

The wintering range is, to some extent, congruent with the breeding range. Many individuals are resident within the breeding range and move only to areas adjacent to open water in winter (coastal areas, as noted above, are adjacent to open water). Others gradually move south in autumn and by winter appear outside the breeding range. The timing, duration and extent of

migration depend on ice conditions and the availability of food. Each winter, drifting ice on the Sea of Okhotsk drives thousands of sea eagles south.

On the Kamchatka peninsula most birds are resident throughout the year (some estimates suggest a population of 3,500 individuals). On north Sakhalin, the Shantar Islands and Amur, on the other hand, the species is a temporary visitor and moves from the summer breeding range to wintering areas on Hokkaido, southern Primorye and Ussuri River valley, arriving in early November, exceptionally in late October (*ibid)*. The majority of birds nesting on Sakhalin Island move south to Hokkaido and the southern Kuril Islands during late October to November (*ibid.)*.

There is some variation in the ornithological community regarding estimated numbers of both breeding pairs and total global population of Steller's sea-eagle.

The International Working Group for the Steller's (Sea) Eagle Conservation "O-Washi-net"[1] IWGSEC website (estimated 1999) states that the "total population" (*i.e.* globally) of Steller's sea-eagle is approximately 3,200 breeding pairs. The website upon which this data is published was set up for the First Symposium on Steller's and White-tailed Sea Eagles in East Asia, Tokyo and Hokkaido, 9-15 February 1999.

The Birdlife International publication *"Threatened birds of Asia: the Birdlife International Red Data Book"* (2001) based on an analysis of original data by A. V. Andreev, states that:

> *"…the most recent information indicates that there are 1,830 – 1,900 breeding pairs and that the total population is probably 4,600 – 5 ,100 individuals".*

According to IWGSEC (estimated 1999) there are 280 (breeding) pairs on Sakhalin Island and a few on the Kuril Islands.

Following surveys in the 1990s, Masterov (1998) estimated that there were 110 nesting pairs and 160 non-breeding birds on Sakhalin Island. Masterov *et al.* (2000), using a predictive model to determine the spatial distribution of suitable nesting habitat, calculated that there were 434 potential nesting territories[2] on Sakhalin. It was also estimated (using data from transect counts and aerial surveys) that the total number of birds in north-east Sakhalin was

[1] An International Working Group for the Steller's (Sea) Eagle Conservation has been established (*circa* 1999), consisting of wildlife research professionals, wildlife managers and conservationists from non-government and government organisations in the Russian Federation, Japan and the USA.

[2] Masterov *et al.* define "nest territory" as the area within 400m of the nest. In his study, the nest territory included the active and old nests belonging to the pair; if the pair was breeding, the active nest was used as the territory centre (Masterov *et al.* 2000). Masterov *et al.* calculate the figure of 434 potential nesting sites using the occurrence of specific habitat types in the coastal zone and from that data determining the likely occurrence of suitable nesting territories.

560, comprising 64.2% adults (*i.e.* 359 adult, and therefore potential breeding birds). This figure was calculated through extrapolation of bird density data for surveyed sections of coastline to unsurveyed sections of coastline showing similar habitat characteristics.

The breeding range is shared with the closely related white-tailed sea eagle *H. albicilla.*

Nesting Steller's sea-eagles are most common in the coastal zone, where rocky shorelines, wooded river valleys, bays and inlets are preferred. In the interior, nesting occurs less frequently in river valleys and on lakes. Throughout the breeding range, nests are usually built in trees and occasionally on cliffs. Nests are often used for several years in succession, but alternate nests are often built, usually within one kilometre of the previous nest. The start of the breeding season depends on the conditions at the end of winter, but is typically late February/early March. Hatching occurs between mid-May and mid-June, and the young fledge in August or early September. Average breeding success is around 0.5 young per pair *per annum*.

The diet of Steller's sea-eagles consists principally of salmon (family *Salmonidae*), taken alive or dead. The species' distribution and seasonal appearances are dictated largely by the availability of the salmon supply. The remainder of the diet is highly variable and important only when the principal food supply is scarce.

The remainder of this section provides information on the following logically ordered topics in respect of Steller's sea-eagle:

- Ornithological studies undertaken and/or funded by SEIC;
- Potential impacts to Steller's sea-eagles from the Sakhalin II project;
- Mitigation measures and monitoring initiatives;
- Residual impacts.

4.3 SEIC ORNITHOLOGICAL STUDIES

4.3.1 Background to Data Collection Initiatives

The data collected for Steller's sea-eagle on the project is a combination of the collation of historical information sources, surveys covering Steller's sea-eagle (as part of wider ornithological surveys) and specifically commissioned surveys. A description of future planned data collection exercises is also included in this section. When the objectives of each survey initiative differ, these are also explained.

The portfolio of surveys, which cover data on the eagle, have been carried out and reported over a six-year period. The individual survey initiatives are best described in chronological order:

i. Onshore baseline ornithological studies and surveys (published between 1998 – 2002)

These baseline surveys included four discrete "coastal lagoon surveys" reported as:

- "***1998 Coastal Lagoon Survey***": Current condition of the population of aquatic, rare and protected species of birds on the territory of the pipeline (FIRC, 1999)
- "***2000 Coastal Lagoon Survey***": Avifauna of Sakhalin North-Eastern Coast bays, Busse Lagoon and Aniva Bay (FIRC, 2001a)
- "***2001 Migratory Bird Survey***": Monitoring of fall migration of aquatic birds at bays of northeast shore of Sakhalin Island and Busse lagoon (FIRC, 2001b).
- "***2003 Coastal Lagoon Survey***": Fauna of the nesting period and monitoring of seabird colonies in the northeast Sakhalin lagoons (FIRC 2003)

ii. Project pre-construction surveys 2003

Report studying rare and protected bird species in the spring period along the surface pipeline route, at sections of pump and compressor station No.2 and gas distribution terminal (Amur-Ussurian Centre for Biodiversity of Birds 2003).

iii. SEIC-funded Sea Eagle Research Programme (2004 and 2005).

Each of these is dealt with in more detail below. By providing a description of the details (e.g. timing and scope of works) of the surveys, the differences in methodologies, approaches and results are clarified.

4.3.2 Survey Initiatives and Results

The ornithological surveys undertaken by SEIC had two objectives. The first was to obtain baseline information on all birds inhabiting onshore project areas (a comprehensive description of the studies undertaken and relevant data on the Steller's sea-eagle is presented in the subsections below). The second objective was to determine migratory bird habitat in coastal lagoon areas for the purposes of input into coastal sensitivity mapping for oil spill response planning.

ii. Baseline Onshore Ornithological Studies and Surveys (1998 – 2002)

Between 1998 and 2002, a number of survey initiatives were carried out in relation to potential construction sites and pipeline routes. Table 4.1 presents a comprehensive list of these surveys and includes both baseline work and the 1998, 2000, 2001 and 2003 coastal lagoon surveys.

Table 4.1 Ornithological Baseline Studies

Organisation	English Title	Date Issued
Russian Academy of Science Far East Branch - Institute for Water and Ecological Problems	Fauna assessment: mammals, amphibians, reptiles and forest birds in the projected Sakhalin oil and gas pipeline areas	1998
State University Enterprise "Rosstroyizyskania"	1998 birds and waterfowl study	1998
Fauna Information and Research Center (FIRC)	Current condition of the population of aquatic, rare and protected species of birds on the territory of the pipeline	1999
FIRC	Ornithofauna of the north-east coast of Sakhalin Island Gulfs, Busse Lagoon, Aniva Gulf and Tyuleniy Island. Literary review	2000
FIRC	Avifauna on Pipeline Route – field studies	2000
FIRC	Avifauna of Sakhalin North Eastern Coast bays, Busse Lagoon and Aniva Bay – field survey 2000	2001
FIRC	Monitoring of fall migration of aquatic birds at bays north-eastern shore of Sakhalin Island and Busse Lagoon (September – October 2001)	2001
FIRC	Avifauna of LNG Plant/OET Site in Prigorodnoye (final report)	2001
Far Eastern State University	Field and desktop study of avifauna in construction sites along pipeline route	2002
Far Eastern State University	Field and desktop study of avifauna along pipeline route (final report)	2002
FIRC	Fauna of the nesting period and monitoring of seabird colonies in the lagoons of north-east Sakhalin	2003
Amur-Ussurian Centre for Biodiversity of Birds	Report studying rare and protected bird species in the spring period along the surface pipeline route, at sections of pump and compressor station No.2 and gas distribution terminal	2003

All of the quantitative observations made during the bird surveys followed three major types, which are used by all ornithologists in different modifications:

- "Field trip registration" (*i.e.* walking a route and counting numbers and positions of birds) – yields a density and number index;
- "Area-related registration", including point observations and mapping;
- "Time-related observations" (*i.e*. counts within a specific time window), based on the number of birds observed per unit of time.

Field trip registration and mapping were the two main methods employed during the surveys. In both cases, systematic classification was determined at the species level and the number of birds observed and the coordinates of either the monitor (*i.e.* the surveyor) location or the monitored object location recorded.

Coastal Lagoon Surveys

Surveys carried out for the purpose of contributing to coastal sensitivity mapping for oil spill planning were conducted in the areas of Piltun, Chaivo, Nyisky, Nabilskii and Lunsky Bays in 1998, 2000, 2001 and 2003.

The field investigations were conducted during different seasons in order to record as wide a variety of resident and migratory birds as possible. Not all the fieldwork was conducted during the Steller's sea-eagles' nesting period and information on the status of individual nests and breeding success was not a specific objective of the studies. However, analysis of the mapping data collected over several years revealed approximately 180 potential Steller's sea-eagle nesting areas within the area of north-east Sakhalin (FIRC 2003). Areas identified as potential for Steller's sea-eagle nesting were established from the basic criteria of either physical presence of a nest or a group of nests, or where a nest was known to have previously existed. The condition of occupancy was not taken into account when establishing potential nesting territories.

In these studies, the particular status of every individual nest was not established, however, the areas important for Steller's sea-eagle nesting habitat were identified and included in the mapping database.

1998 Coastal Lagoon Survey – In 1998, the current condition of the population of aquatic, rare and protected species of birds on the territory of the pipeline was undertaken (FIRC 1999). Some data were presented in the report on Steller's sea-eagle population numbers and geographical distribution. FIRC (1999) based this study on the results of the pipeline route (1997-1998) and aerial (1989, 1990 and 1991) bird registrations. The report outlined *inter alia* typical distribution, habitat, special biological features and summarised historical data sets; for example, the total population numbers of Steller's sea-eagles on Sakhalin Island between 1983 -1987 was reported *"approximately a little more than 100 couples"* (Nechaev 1991 in FIRC 1999).

2000 Coastal Lagoon Survey – The most detailed observations relating to Steller's sea-eagles were performed during the year 2000 field survey (FIRC 2001a). The scope included an assessment of the ornithological population during the summer and fall migration periods in Piltun, Chaivo, Nyisky, Nabilsky, Lunsky and other bays in the south of the island outside the breeding range of the Steller's sea-eagle. The goal of this work was to collect information on species and abundance of resident and migratory birds in inland areas, the shoreline and the lagoon systems. Observations were made in the north-eastern Sakhalin bays periodically from 11 July to 7 October (see Table 4.2 for a schematic of when the observations were carried out).

Table 4.2 . Observation Dates and Sites for Surveys Conducted in 2000 (source: FIRC 2001a)

Site\ date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Month
Piltun										■	■	■									■	■										August
			■	■	■	■	■	■																				■	■	■		September
	■																															October
Chaivo													■	■	■	■	■	■	■													August
			■					■	■	■	■																					September
			■	■	■																											October
Nyisky											■	■																				July
	■	■	■	■																											■	August
	■	■									■	■	■	■	■	■																September
	■	■	■		■	■	■																									October
Nabilsky																			■	■	■	■	■	■	■							July
							■																									October
Lunsky													■	■	■	■	■	■	■													July

Key:

Active observations ■

Overall, the duration of observations was 102 days. The total route length in the observation area amounted to 7,000km. The overall length of onshore foot and boat traverses was 1800km, of which foot traverses involving registration accounted for 70km (FIRC, 2001a).

During the year 2000 lagoon survey, Steller's sea-eagles' nests were categorised into one of the following three:

1. *Existing nest* – confirmed as occupied by Steller's sea-eagles that are breeding or raising young (note: sometimes the term "*confirmed as reproductive*" is used by FIRC);
2. *Occupied nest* – existing nest occupied by birds but not confirmed as reproductive (*i.e.* there is no visual or confirmed evidence that the Steller's sea-eagles are rearing young);
3. Potential (nest) site – a "potential nesting site" is defined as:

   - A nest used by Steller's sea-eagles at least once in the last ten years;

   - A nest exists but has never been recorded as occupied;

   - Where a nest was destroyed but, under favourable conditions, could, in future, be used by sea eagles (FIRC 2001a).

The above terminology is used in many of the following sections.

The investigations for Piltun and Chaivo Bays commenced in August 2000, while Nyisky, Nabilsky and Lunsky Bays were surveyed in the month of July. Considering the breeding-cycle of the Steller's sea-eagle (where fledging occurs in early to mid-August), the data regarding nesting status was more complete for the lagoons observed in July. For areas surveyed in August, however, chicks in some nests would have fledged and would no longer be in their nests. Therefore although birds might still be present, it could not be confirmed that a nest had been used for successful breeding. The sites surveyed earlier in the year would have held non-fledged young in the nests and therefore much greater confidence in actual breeding numbers could be gained. Table 4.2 shows the timing of the surveys carried out in 2000.

Information provided in the original EIA for Steller's sea-eagles used only data presented in the 2000 Coastal lagoon survey (FIRC 2001a). This was because the results of the 2000 survey were the most up-to-date available at the time of writing and contained the most detailed observations.

The original EIA made a statement (below) about the numbers of breeding pairs in the study areas, however, this was somewhat misleading as it did not correctly distinguish between "observed pairs" and "confirmed breeding pairs". Also, no reference is made to the data for Nyisky Bay.

"Between 20 and 22 pairs of Steller's sea eagle nest within Lunsky Bay, 15-18 pairs in Nabilsky Bay, five pairs in Piltun Bay and five pairs in Chaivo Bay (TEO-C Volume 7 Book 1-EIA: Chapter 1, 2002)."

The following paragraphs confirm and further describe the findings from the 2000 survey. In addition, the subsequent Table 4.3 summarises this information.

Piltun Bay The original EIA correctly reported that five pairs were confirmed as reproductive in Piltun Bay in 2000. In addition, the 2000 survey report included five more pairs occupying nests but not confirmed as reproductive. The 2000 survey report (FIRC 2001) also noted there were thirteen other potential nest sites located in Piltun Bay. Therefore, in 2000, up to ten breeding pairs (*i.e.* five confirmed and five unconfirmed pairs) could be nesting in the studied bay area.

Chaivo Bay Five pairs were confirmed as reproductive in Chaivo Bay in 2000. The EIA reported this correctly. In addition, the 2000 survey report included 12 pairs occupying nests, but not confirmed as reproductive. This could be due to the late timing of the Chaivo Bay survey, which began in August. The report also noted there were 16 other potential nest sites located in Chaivo Bay. Therefore, FIRC states that in 2000 the *"number of eagles at the Chaivo Bay is about 17 pairs"* (*i.e.* five pairs confirmed and 12 pairs unconfirmed).

Nyisky Bay During the year 2000 survey, seven pairs were confirmed as reproductive. Four pairs were observed holding to nest sites, however, these were not confirmed as reproductive. The baseline part of same report noted six other potential nesting sites in Nyisky Bay.

Nabilsky Bay The EIA (made a reference to 15-18 pairs nesting in Nabilsky Bay. These figures were based on a combination of the eight confirmed nests and 11 unconfirmed adult pairs (observed nearby the nests) and the expert judgement of the ornithologist conducting the study. The report also noted there were six other places in Nabilsky Bay where pairs of birds were regularly observed but no nests were found.

Lunsky Bay According to FIRC (2001a), Lunsky Bay is the most important area for maintaining the north-east population of the Steller's sea-eagle. The density of nests in this bay is the highest out of all the north-eastern lagoons. A total of 45 nests were investigated in Lunsky Bay in 2000. Adult birds were found at 20 nesting sites. Of these 20 locations, according to Figure 41 of the 2000 survey report (FIRC 2001), nine pairs were recorded as being reproductive and 11 as potentially reproductive (*i.e.* a total of 20 pairs). In addition, four potential nesting sites were identified but two of these were not being used. The report states that 20-22 pairs were nesting.

Table 4.3 Summary of Data on Steller's sea-eagle presented on the 2000 Coastal Lagoon Survey (FIRC 2001a)

Location	Occupied Nests Confirmed as Reproductive	Occupied Nests Not Confirmed as Breeding	Potential Nesting Sites
Piltun	5 pairs	5 pairs	13
Chaivo	5 pairs	12 pairs	16
Ngiskyi	7 pairs	4 pairs	6
Nabilsky	8 pairs	11 unconfirmed	6
Lunsky	9 pairs (based on Fig.4.1, FIRC 2001a)	11 pairs (based on Fig.4.1, FIRC 2001a)	2
TOTALS	34	43	43

In Chaivo Bay, five nesting pairs were confirmed during the 2000 surveys, with another 12 possibly breeding, making a total of 17 pairs. Other researchers have conducted independent research and obtained similar information, for example in Japan where the nesting status of 15 pairs in Chaivo Bay and a total of 80 breeding pairs in north-east Sakhalin (Saito *et al*, 2003) were reported, similar to that above. Indeed, according to the numbers in Table 4.3 above, a total of 34 pairs were confirmed as nesting while 43 more pairs were possibly nesting resulting in a total of 77.

2001 Migratory Bird Survey: This involved the monitoring of fall (autumn) migration of aquatic birds at the bays on the north-east shore of Sakhalin Island and Busse lagoon (FIRC 2001b). The survey conducted in 2001 was focused on migratory behaviour and did not address the nesting status of Steller's sea-eagles. Adult and juvenile Steller's sea-eagle individuals were noted to be holding to the lagoon areas in September with diminishing numbers registered during October as the birds began their migration to the south.

2003 Coastal Lagoon Survey: This survey investigated fauna of the nesting period and monitoring of seabird colonies in the north-east Sakhalin lagoons (FIRC 2003). In 2003, select sections of the bay areas were investigated during the nesting period of the Steller's sea-eagle. Of the 180 known nesting sites in the region ranging from Piltun to Lunsky Bays, 70 sites were investigated during this survey. Of the 70 observed nests, 47 were being utilised by bird pairs. The locations (and respective numbers) of nesting pairs were as follows: south Piltun (4); Chaivo (7); Nyisky (9); Nabilsky (11); and Lunsky (16). It is important to note that not all of the nests in the north-east coastal area were investigated, therefore the nesting numbers referenced here are not absolute totals for each bay.

iii. Project Pre-Construction Surveys (2003)

In line with commitments for ecological monitoring under the Russian project approvals process (TEO-C), bird surveys for rare and endangered species were conducted before construction during the spring nesting season of 2003 in select sections along the pipeline route (Amur-Ussurian Centre for Biodiversity of Birds 2003). Environmental Protection Books (EPB) in the TEO-C specified monitoring for pre-construction. In reference to Steller's sea-eagle, these surveys verified the locations and nesting status of nests near SEIC construction areas located to the west of Nyisky Bay.

iv. Sea Eagle Research Programme (2004 and 2005)

During the summer of 2004, the SEIC-funded Sea Eagle Research Programme (SERP) field activities began. Observations were conducted in areas where steller's Sea-eagles are known to exist and where they could possibly inhabit. All nests were registered by Global Positioning System (GPS) and classified into one of four categories: "reproductive"; "occupied"; "not active"; or "status not determined". This work was performed by independent scientists associated with Moscow State University as part of SEICs overall "Sea Eagle Research Programme" (described in Section 4.6.1).

Between June and August 2004, the investigations carried out along the pipeline route and around the onshore facilities identified five Steller's sea-eagle nests containing reproductive pairs located between 100 and 500m from the pipeline right-of-way (ROW) and three reproductive pairs between 500 and 1,000m from the pipeline ROW.

The precise number of nesting pairs within the vicinity of the pipeline route is complicated by the fact that pairs of Steller's sea-eagles often construct multiple nests within the same area (typically a one kilometre radius) and may occupy any one of these on an annual basis. In addition, weather events are known to destroy nests and bear attacks are also a significant factor in nest viability. Due to these factors, the number of nests near the pipeline route may fluctuate yearly.

No nests were found in close proximity to the OPF site.

Three project-related geographic areas were identified as sensitive areas for Steller's sea-eagle nesting habitat:

- The southern tributaries of Chaivo Bay;
- West of Nyisky Bay where the SEIC pipeline route, along with an existing pipeline ROW and the Nogliki-Okha road and railroad, runs closest to any of the lagoon areas;
- The Lunskoye section of the pipeline route, where tributaries of southern Nabilsky Bay and the Sea of Okhotsk coastline were found to contain Steller's sea-eagle nesting sites.

There are two nest areas in the vicinity of the Lunskoye pipeline landfall and the beach-landing site:

- One nest area to the south, approximately 800m from the pipeline landfall;
- One nest 270m north of the pipeline route access road on the bank of Protochnoye Lake.

Table 4.4 shows a list of the nests located within one kilometre of the pipeline ROW according to data obtained during the 2004 SERP field season. This list reflects the most recent data collected during the summer of 2004.

Table 4.4 Steller's Sea-Eagle Nesting Areas in Proximity to Pipeline Route

No. of nests 0.1 - 0.5 km	No. of nests 0.5 - 1 km	Total no. of nests within 1 km (i.e. cumulative nos.)	Location and Comments on Constraints
0	1 (Not active)	1 (Not active)	West of Goryachi Klyuchi village. Approximately 780m from pipeline route.
1 (Reproductive) 2 (Not active)	1 (Reproductive) 2 (Not active)	2 (Reproductive) 4 (Not Active)	West of Nyisky Bay on Bauri River. Due to the density of nests in the area, a major realignment would be required to move the pipeline route more than 500m away from nests.
1 (Reproductive)	1 (Not active)	1 (Reproductive) 1 (Not active)	West of Nyisky Bay on Bolshoi Veni River. Pipeline route option further east restricted by location of highway and more difficult river crossings. Movement to the west would move the route closer to the nests.
1 (Reproductive)	0	1 (Reproductive)	South of the pipeline on the Vazi River.
0	1 (Reproductive)	1 (Reproductive)	6km west of OPF on Nabil River. Pipeline route option further south away from nest is restricted by difficult river crossings (meanders) and presence of village.
1 (Reproductive)	1 (Reproductive)	2 (Reproductive)	Lunskoye pipeline landfall area. Route established north of Lunsky Preserve border and south of existing development.
1 (Reproductive) 2 (Not active)	0	1 (Reproductive) 2 (Not active)	Tomi River; west of Nyisky Bay on Tomi River. Nest sites located on either side of ROW leaving no option for micro-realignment.
0	2 (Not active)	2 (Not active)	Evai River; south of Chaivo Bay on Evai River. Realignment to the west would move route closer to nests. Movement to the east would infringe upon existing pipeline right-of-way.
1 (Occupied)	0	1 (Occupied)	Askasai River; west of Chaivo Bay. Nest located west of pipeline route. Realignment to the west would move route closer to the nest. Movement to the east would infringe upon existing pipeline right-of-way.
Totals:			**Cumulative total:**
5 (Reproductive) **1 (Occupied)** **4 (Not active)**	**3 (Reproductive)** **6 (Not active)**	**8 (Reproductive)** **1 (Occupied)** **10 (Not active)**	**8 nests containing reproductive Steller's sea-eagle out of 19.**

In terms of overall numbers, there are nine occupied nests (out of 19 nest sites) near the Project's pipeline route.

Additional investigations undertaken in 2005 will further investigate the nesting locations in north-east Sakhalin. The programme, which is described in outline in Section 4.6.1 on monitoring, will further evaluate and define the

breeding status of the nesting grounds around the lagoons and in areas where SEIC assets are located near nesting sites. International experts in eagle research from the United States and Japan have been invited to participate in this Russian-led programme.

4.4 POTENTIAL IMPACTS

Potential direct and indirect impacts on Steller's sea-eagle during construction might include:

- The ingress of human activity and disturbance causing nest abandonment;
- Human activity and noise from machinery and equipment near the shore and offshore could disturb Steller's sea-eagles in terms of interruption of feeding, breeding behaviour and breeding success; or feeding behaviour and possible success in rearing young;
- Potential damage to aquatic habitat reducing number of prey causing feeding irregularities.

During operation, activities such as helicopter flights have the potential to adversely affect nesting Steller's sea-eagles through the generation of noise.

4.5 MITIGATION MEASURES

4.5.1 Introduction

SEIC has gained a wealth of knowledge on the habitats, behaviour and sensitivities of the Steller's sea-eagle, particularly with specific reference to Sakhalin. This migratory species is known to be generally resident on Sakhalin for nine to eleven months of the year. Research and studies carried out have enhanced knowledge the understanding of sensitive periods of the year for the species (e.g. for breeding, fledging, etc.), which, in turn, has assisted the design of effective mitigation measures.

4.5.2 Aims of Mitigation and Guidelines

The aim of outlining mitigation guidance is to:

- Reduce the magnitude of the impact from construction activities that may potentially cause disturbance to Steller's sea-eagles;
- Minimise the potential impact on Steller's sea-eagles during the operations phase of the project;
- Define potential measures to enhance the conservation of the species.

SEIC constructed the OPF Beach Landing Facility (BLF) and pipeline landfall (including a cofferdam) at Lunskoye in summer 2004 and implemented a

mitigation plan to minimise disturbance to Steller's sea-eagles nesting in the area.

Guidelines specific to the Lunskoye pipeline landfall area and associated construction activities were developed and implemented in 2004 (*"Lunskoye Landfall: Steller's Sea-Eagle Nest Mitigation Guidelines",* SEIC 2004). Furthermore, a Steller's sea-eagle awareness presentation was also developed and incorporated into the construction site HSE induction exercise, which has to be undertaken by all new contractors to the site. The presentation included introductory material on the biology of Steller's sea-eagle, sensitive locations near SEIC construction areas, and mitigation efforts to be taken during construction activities. The Guidelines were updated in 2005. Nest specific mitigation measures were developed in Quarter 1 2005.

It is important to note that the mitigation guidelines will be case specific *i.e.,* they will provide specific measures to be applied to each individual case where Steller's sea-eagles nesting sites might potentially be affected by the project, for instance where the pipeline route encroaches on a nesting area. For each case, adverse impacts will be assessed and appropriate mitigation options selected, that may include:

- Timing of construction in important areas for Steller's sea-eagle by acknowledging their migratory status and thus avoiding sensitive periods for fledgling etc. For example, the ROW clearance and construction is scheduled in the winter months, outside the nesting season;
- Establishment of a buffer zone within which no construction activity will be permitted during the nesting season;
- Establishment of a buffer zone around Steller's sea-eagle nests within which certain activities that may lead to disturbance (*e.g.* refuelling, storage, waste and materials stockpiling, accommodation camps, and water abstraction and discharge) should not take place. Buffer zone sizes are to be established in accordance with the characteristics of the surrounding landscape. 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 2005 (see also Section 4.5.3);
- Establishment of artificial nesting sites[3];
- Monitoring the wellbeing of individual pairs of Steller's sea-eagles nesting in proximity to construction activities.

[3] There is the potential to enhance the conservation of Steller's sea eagles through developing artificial nesting sites. Such sites have been successfully provided for the closely related white-tailed sea eagle. The acceptance of artificial nests by white-tailed sea eagles has proven to be about 50% in Lithuania and Sweden, and as many as 23% of the pairs in Finland bred in artificial nests in 1998 (Action Plan for the Conservation of White-tailed Sea Eagle, Standing Committee Convention on the Conservation of European Wildlife and Natural Habitats, December 2002).

4.5.3 Buffer Zones

The size of buffer zones around nests of sea eagles are determined based on data relating to the territories protected by birds, as well as the distances of expressed response to disturbance. The sizes of buffer zones also depend on the presence of surrounding vegetation, which offers sheltering from the source of disturbance. In the case of good sheltering, the sizes of buffer zones can be decreased by 20-25%.

Rodgers and Smith have proposed general principles for the practical calculation of sizes of buffer zones (1997). They studied different types of effects (*e.g.* ingress of tourists, vehicles, boats etc.) on 16 bird species.

These authors suggested the following algorithm for calculating the radius of a buffer zone around a bird's location: R_{buf} = exp (M + 1,6495 σ) + 40, where M is the mean flush distance, and σ is the variance.

To determine buffer zone dimensions, archival data was used. This data included the results of field experiments performed in 2002 in the Lower Amur (Masterov and Taldenkov, in press) and published data on closely related species (white-tailed sea eagle and bald eagle).

As a result of the analysis of data, a guideline primary buffer zone for Steller's sea-eagles is recommended at 350 – 400m. This will continue to be investigated during future monitoring initiatives (see Section 4.6).
These guidelines will be specifically developed for each nest within influence of the pipeline ROW based on the results of the 2004 survey season. Established mitigation actions will be communicated to construction contractors and will be included in their environmental plans. As part of the guidelines, SEIC will ensure that construction crews are adequately briefed on the mitigation actions and the importance of avoiding disturbance to Steller's sea-eagles, in particular with regard to the necessity to minimise the time that construction activities take in the vicinity of areas used by Steller's sea-eagle for nesting or feeding.

SEIC's "No Hunting, Gathering, Fishing Policy", which prohibits the construction workforce from engaging in hunting, fishing and gathering in key areas is described in the Social Impact Assessment.

4.5.4 River Crossings

Mitigation measures to minimise the impacts of construction activities on pipeline watercourse crossings were outlined in Chapter 3 of Volume 4 of the international-style EIA, which have been further detailed in the River Crossings Report (a component of the EIAA). These measures – such as the control of refuelling activities in the vicinity of watercourses and the control of sediment runoff into watercourses – are of particular relevance in areas used by feeding Steller's sea-eagles (*e.g.* watercourses with spawning salmon).

As part of the pipeline River Crossings Report, all rivers that will be crossed have been classified for their physical characteristics and fisheries sensitivity (see separate EIA-A chapter). SEIC has given a commitment that crossings of all of the most sensitive rivers (namely, those that fall within Group II and Group III) in the northern part of the island will be undertaken in winter.

River crossings that are in proximity to, and might impact, Steller's sea-eagle nesting sites include the:

- Askasai
- Evai
- Tomy
- Bauri
- Bolshoi Veni
- Vazi
- Nabil

The above listed rivers are classified as Group III rivers by SEIC and the Sakhalin Region Fisheries Agency, Sakhrybvod, meaning that they are the most sensitive in terms of fisheries interests. They will be crossed in winter when the eagles have migrated south.

4.5.5 Helicopter Activity

As mentioned earlier, helicopter flights during the operation of the project have the potential to disturb nesting Steller's sea-eagles. Flight routes will take account of the need to avoid flying over nesting areas during the critical portion of the nesting season (*i.e.* the first three months of breeding period and nest building); this requirement will be incorporated into the mitigation guidelines. In the Steller's sea-eagle Nest Mitigation Guidelines document (ibid.), for example, SEIC states that helicopter flights shall be restricted to using a 600m (radius) zone around, and 300m elevation above, the nest during the period 15 March to 15 September, except in the case of an emergency. Furthermore, helicopter-landing sites shall be located at a distance of one kilometre from nesting sites, except in cases of emergency. This height was selected upon advice from Steller's sea-eagle experts.

4.5.6 Oil Spill Response Planning

The SEIC Oil Spill Response Plan (OSRP) will include an assessment of coastal and lagoon sensitivities, incorporating the presence of Steller's sea-eagles. The preparation of such information, including feeding areas for instance, can be integrated with OSR sensitivity maps and thus contribute to the overall selection and location of OSR equipment and logistics. The coastal sensitivity maps, developed from the results of the survey, will be utilised as part of this initiative. In this way, the coverage of the OSRP includes the geographical areas used by Steller's sea-eagles for feeding and nesting. More specifically, maps showing the location of Steller's sea-eagle nests and sensitive locations in proximity to the pipeline route have been

prepared as a tool for planning mitigation. These were updated in 2004 and provided to the contractor so that the locations of individual nests are known.

Residual impacts are discussed later (refer to Section 4.8) because some monitoring activities involve long-term research that encapsulates the continual development of mitigation measures.

4.6 MANAGEMENT OF CONTRACTOR AND MONITORING

The implementation of environmental management techniques during construction activities is the responsibility of the contractor. SEIC has therefore taken forward a number of initiatives to encourage, strengthen and assist in ensuring that these measures are undertaken effectively. Communication between SEIC and its contractor in respect of the standards and requirements that are required is vital. The following sections highlight the pertinent requirements relating to Steller's sea-eagle, awareness initiatives and environmental management tools that are being, or will be, carried out.

An organisational structure is in place to help ensure the effective implementation of mitigation measures. This involves specialist staff from SEIC and the contractor including both local, Russian national and international staff. Activities to be implemented embrace a wide spectrum of monitoring controls including elements of compliance, performance and ecological surveys (described in the following sections).

4.6.1 Monitoring of Mitigation Measures

SEIC will interact with the construction contractor in relation to a wide range of activities in order to meet its intended goals for environmental management. This is necessary to bridge the gap that often occurs between commitments made in environmental documentation during the planning phase of a project and the construction phase.

This kind of approach is exemplified in the preparation of practical mitigation documentation. Alongside awareness raising and training, this is a key component of the organisational structure that is being put in place to help ensure the effectiveness and implementation of such measures.

One example, developed by SEIC with specialist consultants, is the *"Lunskoye Landfall: Steller's Sea-Eagle Nest Mitigation Guidelines"* (SEIC 2004). The document incorporates the requirement for a wildlife monitor to be appointed for the purpose of eagle observation during activities at this asset. This document, which describes responsibilities, guidelines for behaviour on site (*e.g.* operation of vehicles, appropriate timing of human activities, waste management) and asset specific activities (*e.g.* at the pipelines landfall, BLF, onshore pipeline and road construction) has already been utilised in the training of construction contractors.

Steller's sea-eagle Nest Mitigation Guidelines (referenced earlier) will be drawn up for all key construction sites.

4.6.2 Compliance Monitoring

Russian Federation Order 600, in authorising the project to move forward, recognised the importance of the Steller's sea-eagle nesting areas and has ordered SEIC to not work between old KPs 75-104 for the period mid-April to mid-July.

All eagle nests do not fall within the above mentioned kilometre points, therefore SEIC has ordered the pipeline contractor to maintain a buffer distance of 500m from any active Steller's sea-eagle nests. This effectively stops construction over limited sections of ROW during sensitive periods when the eagles are present. As a site inspection and auditing exercise, SEIC will check adherence to this policy.

As part of SEIC's commitments to TEO-C, ROW and off-ROW monitoring of geological processes, surface and ground waters, soils and biota will be carried out in three phases: pre-construction, construction, and commissioning (operations). Geological processes to be monitored include landslide and erosion monitoring whilst soil monitoring involves chemical analysis of samples and verification of correct stripping activities. Groundwater monitoring will be accomplished by drilling 107 groundwater monitoring wells at pre-selected points along the ROW and for surface water monitoring, 93 rivers will be sampled for hydro-chemical properties.

Flora monitoring has an objective of determining the reaction of vegetation and rare species to anthropogenic factors. Fauna monitoring is focused on definition of rare species habitats along the ROW and this will include Steller's sea-eagles. Operations phase efforts are focused on determining the effects of human disturbance, if any, on sensitive species.

These monitoring initiatives during the operation phase will, with the exception of selected rivers (which will be annually for five years), be once every five years for the life of the project.

4.6.3 Ecological Observation Monitoring

Each pipeline spread has a number of staff responsible for environmental monitoring; SEIC employs one staff member as an environmental monitor on each spread whilst the construction contractor typically employs two, including nationals. Likewise, each subcontractor employs a monitoring person. The presence of these staff members helps to ensure the implementation of SEIC mitigation measures and adherence to SEIC standards.

SEIC also employs a construction site representative (CSR), a site engineer, and numerous pipeline construction inspectors. Both the CSR and the site engineer are aware of environmental requirements and share ultimate responsibility for compliance with construction plans and procedures, including environmental issues.

The Lunskoye Landfall Steller's sea-eagles Nest Mitigation Guidelines, referenced above, includes for a staff member to be responsible for

documenting the behaviour of any nesting pairs / offspring and any other eagles visiting the area near construction. The frequency of observations is increased during elevated periods of construction. Guidance, maps, instruction and a template observation sheet are all provided in the Mitigation Guidelines.

In addition to the construction organisation's monitoring programme, audits will be carried out internally by SEIC's pipeline construction organisation, the central HSE group and externally, for instance, by independent third party specialists for Lenders.

4.6.4 Other Monitoring

There will be a range of other activities involving the checks of both compliance and performance. Such work may be carried out internally (e.g. by the environmental management teams at the assets) and by third parties, for instance, Lenders, investors and interested third parties. This work will cover the construction and operation phases. For example, audits and checks will be carried out to ensure that the contractor and SEIC are progressing in line with mitigation measures and according to strategic goals and objectives.

In terms of voluntary, internal initiatives, SEIC will also embark on a major data management initiative to centralise the wealth of information and data collected from historical baseline surveys and studies into a Geographic Information System (GIS). Such an information system will be a valuable tool to manage data monitoring initiatives. Furthermore, this will also have valuable links into existing information systems such as SEIC's internal Livelink.

4.7 SPECIFIC MONITORING PROGRAMME

4.7.1 Sea Eagle Research Programme (SERP)

In Autumn 2003, SEIC implemented a specific and dedicated two-year Programme for Research, Monitoring and Conservation of the Sea Eagle Population of north-east Sakhalin (known as the SERP).

SERP is a long-term research project that aims to monitor and conserve Steller's and white-tailed sea-eagles in north-east Sakhalin. The goal of the programme is two-fold. Firstly, the programme seeks to verify and monitor nest locations in the vicinity of SEIC project areas and to develop suitable mitigation measures for use during the construction period. Secondly, the programme serves a bigger picture goal of a commitment to conserve biodiversity and promote sustainable development. To this end, a comprehensive plan is being established to evaluate the population abundance and health status of Steller's sea-eagles in the north-east area of Sakhalin, where there are several natural resources development projects underway led by domestic and international operators.

The programme has been undertaken by Moscow State University. This is a major funding initiative of SEIC and one that is expected to contribute significant benefits in terms of the local, national and international knowledge to be gained regarding this "vulnerable" (Birdlife International 2004[4]) species. The SERP is divided into three major tasks:

- To monitor the current abundance of Steller's and white-tailed sea eagles in areas of north-east Sakhalin and to analyse the dynamics of the population abundance over the period 2003-2006;
- To estimate the current health status of the population of Steller's sea-eagle in areas of north-east Sakhalin;
- To develop guidance for mitigation measures for Steller's sea-eagles potentially impacted by construction activities.

4.8 RESIDUAL IMPACTS

A key part of the SERP is the development of further guidance for mitigation measures for Steller's sea-eagles potentially affected by construction activities and the operation of the Sakhalin II Project.

The principal aim of the SERP and of the mitigation guidelines will be to ensure that suitable mitigation measures continue to be developed in order to reduce impacts to as low as reasonably practicable (ALARP).

[4] 2004 IUCN Red List Category (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN)

In the context of the main potential impacts to Steller's sea-eagles during construction, the mitigation (and other measures) contained in the project will act to reduce residual impacts to ALARP levels. Examples are shown below:

- The pipeline ROW does not affect trees along the route containing Steller's sea-eagles' nests; these have been avoided;
- Nests located along rivers with significant fishery value are scheduled for winter construction, outside the Steller's sea-eagle breeding timeframe;
- There will be minimal disturbance at the coast (*i.e.* most of the heavy construction work is offshore), where Steller's sea-eagle are most active in terms of feeding;
- A strict prohibition on hunting will be applied;
- The location of nests will not be made publicly available;
- The contractor will utilise environmental management techniques to minimise the duration of potentially disturbing construction activities;
- The measures described in other EIA-A chapters to minimise impacts to fish and aquatic habitat will also reduce potential secondary impacts to Steller's sea-eagles.

The operation of the pipeline involves a less conspicuous presence of human activity and machinery. The pipeline remains buried and there are no booster stations near areas used by Steller's sea-eagle. Only occasional vehicular traffic will frequent the route of the pipeline for the purposes of routine inspections. Furthermore, the location of nesting Steller's sea-eagle will be taken into account when defining the routes of helicopter flights. For these reasons, operational impacts are expected to be negligible.

4.9 FINDINGS

Knowledge gained from studies commissioned by SEIC has increased the understanding of the sensitivities of Steller's sea-eagle.

Based on current knowledge of the Steller's sea-eagle population on Sakhalin and the locations of nests in the vicinity of the project, up to nine pairs may nest within one kilometre of project activity. A larger number could conceivably be present over a wider geographical area, for example, when searching for food in areas that feature project activities, although this larger number would be substantially less subject to any disturbance effects. A maximum of nine pairs could therefore be potentially disturbed in nesting, feeding and rearing their young. Each of these nesting sites will be assessed individually and mitigation measures appropriate to each situation implemented.

In the context of the potential impacts and their mitigation during construction, the residual impact of the project to Steller's sea-eagle is considered to be minor, temporary and localised. For operation, the impact would be negligible.

The key to successful protection measures is a combination of effective implementation of control measures in the field, the application of practical environmental management techniques by the contractor and continued and timely carrying out of the Steller's sea-eagle Research Programme.

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