

**Classification:** Restricted  
**Issue Purpose** Approved for Use

**BM Code:** EP.17.03.07  
**April, 2006**



## **Sakhalin Energy Investment Company LTD.**

### **PHOTOGRAPHIC IDENTIFICATION OF THE OKHOTSK-KOREAN GRAY WHALE (ESCHRICHTIUS ROBUSTUS) ALONG NORTHEAST SAKHALIN ISLAND, RUSSIA, 2005**

**Document Number: 0000-S-90-04-T-8079-01-E**  
**Revision 01**

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Rev 01

## Document History

Filename 0000-S-90-04-T-8079-01-E

| Date     | Issue | Custodian       | Process Owner    | Authoriser       | Consulted | Distributed |
|----------|-------|-----------------|------------------|------------------|-----------|-------------|
| 21-04-06 | 01    | Lisanne Aerts   | Andrew J. Pearce | Andrew J. Pearce |           |             |
|          |       | <i>PP Aerts</i> | <i>A Pearce</i>  | <i>A Pearce</i>  |           |             |

## Revision Details

| Rev | Location of Change | Brief Description of Change |
|-----|--------------------|-----------------------------|
| 01  |                    | Approved for Use.           |
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OKHOTSK-KOREAN GRAY WHALE  
(*ESCHRICHTIUS ROBUSTUS*) ALONG  
NORTHEAST SAKHALIN ISLAND, RUSSIA,  
2005**

**Final Report**

***Prepared for:***

**Exxon Neftegaz Limited and Sakhalin Energy Investment Company Ltd.  
Yuzhno-Sakhalinsk  
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**March 2006**

**FAR EAST BRANCH OF THE  
RUSSIAN ACADEMY OF SCIENCES**

**MARINE BIOLOGY INSTITUTE**

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**REPORT  
ON SCIENTIFIC RESEARCH**

**PHOTOGRAPHIC IDENTIFICATION OF GRAY WHALES  
(*ESCHRICHTIUS ROBUSTUS*) OF THE KOREAN-OKHOTSK  
POPULATION ON THE NORTHEAST SHELF OF SAKHALIN  
ISLAND, RUSSIA, 2005**

**Final report**

Research Supervisor,  
Candidate of Biological Sciences

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VLADIVOSTOK  
2006

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## ACKNOWLEDGEMENTS

The whale photographic identification surveys were made possible by the participation of scientific personnel and crewmembers of vessels of the Far East Branch of the Russian Academy of Science. Special thanks go to V. I. Ivanov and I. N. Turkin, captains of the vessels *Akademik Lavrentyev* and *Akademik Oparin*, for leading the cruise and managing safe operations; to boatswains A. P. Afanasyev and A. I. Reshetnyak for providing safe and successful zodiac launches and recoveries, and to N. I. Ivanov (Institute of Geography, Vladivostok) for ensuring uninterrupted communication between the Zodiac and the base vessel; to marine observers M. K. Maminov and E. P. Shevtsov (Pacific Fishery Research Institute – TINRO-Center, Vladivostok) for providing information on whale distribution and transmitting this information on whale movements to the Zodiac during the 2005 Photo-ID surveys; to K. A. Drozdov and O. N. Miroshnikova for help in processing the data; and to I. N. Zhmayev and V. E. Nechayuk for overall coordination of the fieldwork.

A number of experts from LGL Limited, (Sidney, British Columbia, Canada and Vladivostok, Russia), provided support and training. We wish to thank Sonya Meier, Sergei Yazvenko and Steve Johnson for project preparation and management, Christina Tombach Wright for providing technical training and support, Julia Yazvenko and Igor Zhmayev for translation during training sessions, Peter Wainwright, Robin Tamasi, Tony Mochizuki, Igor Zhmayev and Yury Bychkov for technical assistance in the creation and management of a digital photo organizational database and GIS mapping, and Dorothy Baker (LGL Limited) for computer support.

Support and funding for this study was provided by the Sakhalin-1 (operated by Exxon Neftegas Limited) and Sakhalin II (operated by Sakhalin Energy Investment Company)

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## INTRODUCTION

The Pacific gray whale (*Eschrichtius robustus*) is currently comprised of two populations: eastern (California-Chukotka) and western (Korean-Okhotsk). The eastern gray whale population reached its peak in 1999, when it exceeded 26,000 animals (Rugh et al. 1999), although some data from recent studies in 2001/2002 suggest that the population has since declined to approximately 18,000 (Rugh, 2003). In November 1991, by resolution of the U. S. National Oceanic and Atmospheric Administration (NOAA), the eastern gray whale was removed from the endangered species list, which had been its status since 1967.

In contrast, the western gray whale population numbers far less than the eastern population and the conservation status of the Korean-Okhotsk gray whale population has received increasing attention in recent years (Webster, 2003). The western gray whale population has been classified as endangered (Category I) in the Russian Federation Red Book (Perlov et al., 1996; Russian Federation Red Book, 2000). The United States government also classifies the western population as an endangered species (U.S. Fish and Wildlife Service [USFWS], 1997).

Presently, western gray whales are considered by the IUCN to be critically endangered (Hilton-Taylor, 2000; Weller and Brownell, 2000). The IUCN criteria used to support this classification were as follows: (1) the population in question is both geographically and genetically isolated (LeDuc et al., 2002); and (2) there are probably fewer than 50 animals in the population capable of reproduction (Hilton-Taylor, 2000; Weller and Brownell, 2000; Bradford, 2003).

Much of the gray whale life cycle takes place in the coastal waters of densely populated countries with intensive fishing and shipping. Western gray whales are presumably close to various levels of anthropogenic activity during all three stages of their life cycle: (1) during whale reproduction in the southern part of their range, the location of which is currently unknown; (2) during prolonged north-south migrations, the route which is currently unknown; and (3) in their known feeding areas off the northeast coast of Sakhalin Island, Russia. Historically, the distribution of gray whales in the Sea of Okhotsk apparently has included Sakhalin Bay (on the west side of the NW end of Sakhalin Island), Akademiya and Tugurskiy bays south of the Shantarskiy Islands (in the far western Okhotsk Sea, west of the NW end of Sakhalin Island), the northeast shelf of Sakhalin Island, Shelikhova, Penzhinskaya and Gizhiginskaya bays in the far northeast portion of the Okhotsk Sea, and the waters west of the Kamchatka Peninsula (Krupnik, 1984; Yablokov and Bogoslovskaya, 1984; Perlov et al., 1996). The long-held belief that the whales' wintering grounds were along the southern coast of the Korean Peninsula (Rice, 1998) has not been substantiated to date. The gray whales' wintering grounds are now believed to be located in the South China Sea, possibly along the coast of Guangdong province and/or around Hainan Island (Rice, 1998). However, specific calving sites have never been observed. In addition to potential impacts on whales from increased vessel traffic associated with intensive fishing and commercial and recreational navigation, the countries of Southeast Asia still have strong traditions involving the consumption of whale meat (Lento et al., 1998; Wang, 1998).

Photographic identification (hereafter referred to as "Photo-ID") of marine mammals has proven to be a useful tool for monitoring wild populations of animals while minimizing the impact on individuals. When incorporated into a long-term monitoring program, Photo-ID can be a valuable tool used to answer many ecological questions about populations of marine mammals. For small or isolated populations, Photo-ID can be used effectively in assessing population size and variation over time (Whitehead et al., 1997; Cerchio, 1998; Stevick et al., 2001; Bradford, 2003; Weller et al., 2003, 2004; Calambokidis and Barlow, 2004). For large whale populations, Photo-ID has been used to identify long migration routes (Best et al., 1993; Darling et al., 1996; Craig and Herman, 1997; Salden et al., 1999; Weller et al., 2002), feeding ranges, and interannual changes in whale distribution (Calambokidis et al., 2002, Clapham et al., 1993). For these large whale species, Photo-ID can be used as an effective method of examining health indicators of individuals as well as the overall health of groups or populations (Pettis et al., 2004; Bradford et al. 2005; Tyurneva and Yakovlev 2005 a,b,c). Photo-ID has proven to be an especially useful tool in gray whale studies (Darling, 1984; Würsig et al., 1999, Calambokidis et al., 2002), as individuals are distinctly distinguishable by characteristic markings on their sides, backs and flukes.

## **PURPOSE AND OBJECTIVES**

Sakhalin Energy Investment Company Ltd. (SEIC) and Exxon Neftegas Limited (ENL) are currently participating in the development of oil and gas reserves on the Okhotsk Sea shelf off the northeast coast of Sakhalin Island, Russia, while a number of other companies are poised to begin developing reserves in the region. Oil and gas development is in proximity to gray whale feeding areas on the northeast shelf of Sakhalin Island. Data are required to assess potential risks and design appropriate measures to minimize potential effects on the western gray whale population. Photo-ID work is a key tool in effective monitoring studies necessary for providing data and input into mitigation development strategies and in monitoring their effectiveness.

The technical objective of the work was to continue Photo-ID studies to assess the whales' annual return rates and patterns of site fidelity for known individuals and to define the size, structure and status of the population. Photo-ID techniques can be used to assess various aspects of western gray whale ecology such as:

- abundance estimate
- inter and intra-annual fidelity of individual whales to specific feeding areas
- individual foraging patterns and movement between feeding and migration areas
- individual associations and group stability
- number, status and habitat use of cow/calf pairs (calf birth and survival rates) and timing of cow-calf separation (weaning)
- physical status and individual health indicators
- population demographics and structure

- population status (including recruitment, emigration and immigration, birth and deaths, and fluctuations or change in population structure)

## BACKGROUND

Two primary gray whale feeding areas have been identified off Sakhalin Island. A shallow-water (generally <20 m) feeding area is located along the coast adjacent to Piltun Bay (Brownell and Chun, 1977; Sobolevsky, 2000; Weller et al., 2004; Blokhin et al., 2003, 2004; Yakovlev and Tyurneva, 2003, 2004, 2005a,b,c; Vladimirov et al. 2005). Another deeper water “Offshore” feeding area is located about 30-40 km off of Chayvo Bay, in waters of 35-60 m deep (Miyashita et al., 2001; Maminov and Yakovlev, 2002; Blokhin et al., 2003, 2004; Yakovlev and Tyurneva, 2003, 2004, 2005a,b,c) (Figure 1). However, whales are also observed along the entire northeast coast of Sakhalin Island (Blokhin et al. 2004). Gray whales begin arriving off northeast Sakhalin Island in late May, when the sea ice has cleared, with some whales remaining until early December, when ice formations reappear.

Specialists from the Institute of Marine Biology (IBM) of the Far East Branch of the Russian Academy of Science (DVO RAN) began working in both (Piltun and Offshore) feeding areas since 2002 (Yakovlev and Tyurneva, 2003, 2004, 2005a,b,c).

There have been reports of previous observations in this Offshore area (Sobolevsky, 2000; Miyashita et al., 2001), and it is quite probable that the area was used by gray whales prior to 2001. Any data on whale sightings in the Offshore prior to 2001 are incidental and survey effort was low. Photo-ID of gray whales in the Offshore area in during 2002-2005 (Yakovlev and Tyurneva, 2003, 2004, 2005a,b,c) confirmed that some individuals observed in the Offshore area were also present in the Piltun feeding area; inter- and intra-year interchange of whales between feeding areas was also confirmed. These results suggest that the whales travel between their summer feeding sites, most likely in search of their preferred prey.

Large-scale studies of whale food resources on the northeast shelf of Sakhalin Island funded by the oil and gas production sector began in 2001 and continued in 2002, 2003, 2004 and 2005 (Fadeev, 2002, 2003, 2004, 2005, 2006). The shallow waters (5-15 m) in the Piltun feeding area are distinguished by an abundance of potential prey for gray whales, including amphipods, isopods, bivalve mollusks and worms that form concentrations along the ocean bottom. In 2004, concentrations of sand lance, a potential gray whale prey item, were found off Piltun in waters more than 20 m deep (Fadeev, 2005). The offshore area is characterized by high concentrations of tube-dwelling ampeliscid amphipods. “Shifts” in the gray whale distribution in both the Piltun and the Offshore feeding areas within and between seasons have been noted by a number of authors (Johnson, 2002; Weller et al., 2004; Perlov et al., 2003; Blokhin et al., 2003, 2004) and since these shifts were noted during years with no anthropogenic activity, are considered to be at least partially a reaction to seasonal changes in the distribution and abundance of prey (Fadeev, 2003, 2004, 2005, 2006).

Higher whale population density has been reported in some parts of feeding areas compared to others. For example, a high whale population density has been

reported, as a rule, (1) in the southern part of the Piltun feeding area near the mouth of Piltun Bay (Gailey et al. 2004, 2005; Maminov, 2004; Weller et al., 2004; Blokhin et al. 2004; Vladimirov et al. 2005), where cow/calf pairs are often observed, and (2) in the northern part of the Piltun feeding area (Blokhin et al., 2003, 2004; Gailey et al., 2004, 2005; Maminov, 2004, 2005; Vladimirov et al. 2005). Again, patterns of gray whale prey distribution may explain the aggregations or seasonal changes in the distribution the whales and the movement of individual animals both within feeding areas and between the Piltun and Offshore feeding areas (Maminov and Yakovlev, 2002).

Studies indicate a relationship between reproductive success and body condition (Pettis et al., 2004), and Photo-ID makes it possible look at the relationship between the birth rate and physical condition at both individual and population levels. In 1999, the US-Russian Photo-ID team noted that some of the whales they observed were noticeably thin (Weller et al., 2000). They used the following features to identify an abnormally thin whale:

- a visible subdermal protrusion of the scapulas with characteristic thoracic depressions where the pectoral flippers connect with the body;
- noticeable depressions around the blowhole and head;
- a pronounced ridge along the dorsal spine of the lumbar and caudal vertebrae resulting in a bulge along the lateral flank.

Seasonal fluctuations in blubber fat reserves in baleen whales are normal after winter periods of fasting and during migration (Perryman and Lynn, 2002), and cows can be significantly thinner during years in which they are nursing calves (Pettis et al., 2004; Weller et al., 2004). Photo-ID methods can be used to detect normal as well as changes in body condition outside the norm due to disease or starvation (Thompson and Hammond, 1992; Pettis et al., 2004).

The discovery in September 2001 of a new primary gray whale feeding area, the Offshore area (Maminov and Yakovlev, 2002), offered IBM researchers the opportunity to study whales in detail in this area for the first time in 2002 and to determine whether there were movements of whales between the two feeding areas. Large numbers of gray whales were present in the Offshore area in 2002 and 2003 (Yakovlev and Tyurneva, 2003, 2004; Blokhin et al., 2003, 2004, 2004; Maminov, 2003; Weller et al., pers. comm., May 2004) and decreased significantly in 2004 and 2005 (Vladimirov et al. 2005, 2006).

The current study monitors the number of individuals in the population and the number of cows with calves, to determine the physiological condition of gray whale individuals, and to provide data on the whales' seasonal and daily movements in both the Piltun and Offshore feeding areas, as well as their movement between areas.

## METHODS

### Study Area

The study area covers the entire northeast coast of Sakhalin Island, including the Piltun feeding area (52°40' N. L. to 53°30' N. L.) stretching along the shore of Piltun Bay, and the Offshore feeding area located offshore of Chayvo Bay (51°50' N. L. to 52°25' N. L.) at depths of 35-60 m. Photo-ID effort was concentrated in these two feeding areas, but whales were also photographed opportunistically if encountered outside of these regions.

The research vessels *Akademik Lavrentyev* and *Akademik Oparin* were the base ships for Photo-ID and other parts of the monitoring program, including vessel surveys of marine mammals, prey studies, and acoustic studies.

### Field Photo-ID

In 2005, Photo-ID was conducted by the Institute of Marine Biology (IBM) in both the Piltun and Offshore feeding areas. Photo-ID was conducted from a deployed zodiac when the opportunity presented itself during other ongoing studies being conducted on the mother vessel. The zodiac was launched when gray whales were encountered, and sea conditions were favorable for Photo-ID work. Because a number of other gray whale studies (prey sampling, vessel surveys, acoustic monitoring) were also being conducted from this research vessel, Photo-ID surveys were conducted opportunistically, performed only when gray whales were sighted during other vessel tasks.

Photo-ID of gray whales in 2002 and 2003 was conducted from a zodiac with a two-stroke outboard motor. In 2004 and 2005, a 3.8 m zodiac was equipped with a 45 HP four-stroke Mercury outboard motor to reduce noise, pollution, and increase efficiency. Photography work was conducted from the zodiac when weather and sea conditions allowed it to be used safely. As safety is the primary concern for everybody involved in the project, the work was halted in the presence of weather conditions unfavorable for Photo-ID (dense fog; high, wind-driven waves; torrential rain; high seas; and poor light).

Visual observations of marine mammals were conducted from the vessel during daylight hours in all types of weather. Information about the locations of gray whales gathered in the course of these continuous observations, conducted concurrently with other vessel research monitoring tasks, allowed the Photo-ID team to travel directly to gray whale aggregations and reduce search time. This was particularly important in the Offshore feeding area, where the distances between groups of whales or individuals were relatively large, and the whales' movements were less predictable.

When the *Oparin* approached within ~ 2 km of a group of gray whales the vessel was brought to a full stop. The bridge then informed the Photo-ID team members of the whale sighting, and after a safety briefing, the zodiac was launched from the vessel. The zodiac was equipped with a digital depth finder and a portable global positioning

system (GPS) navigator. Each zodiac was also outfitted with all safety equipment required for sea safety procedures. The research team consisted of a boat driver, a data recorder, a digital video camera operator and a digital camera photographer.

Upon initial sighting of a whale, the driver slowed the zodiac to idling speed and maneuvered to a vantage point approximately 100 m from the whale(s). From that point, the whales' position (as determined by the GPS), the time, behavior, number of whales in the area, direction of their movement, the presence of killer whales, and passing vessels, airplanes or helicopters in the observation area were noted. The presence of mud plumes, both at whale feeding sites near the launch and when no whales were visible, was also recorded. Secondary indicators of whale feeding, such as circling or diving birds or shoaling fish, were also recorded. If whale foraging was observed (as confirmed by mud plumes or assumed from typical movements and behavior), the exact GPS position of the whales was recorded and communicated to the base ship via VHF radio.

Upon completion of the Photo-ID mission, and only after the zodiac and the whales had vacated the area in question, the vessel would return to the previously transmitted GPS coordinates to obtain benthic prey samples using a Van Veen bottom grab sampler (Fadeev 2005). All data was recorded on waterproof data sheets and entered into a laptop computer at the end of each Photo-ID mission.

To minimize potential impacts on whales, the zodiac would approach to a distance of 100 m from the whale to photograph an individual. The frame and video recording counter numbers in reference to the whales identified, the position (as determined by GPS), the depth (according to digital depth finder data), the temperature (at the sea surface) and salinity of the water, the distance to the whale, and the course according to compass readings were indicated on the data sheets. The data was recorded during each mission and each photo session as the parameters changed.

A Nikon D1X digital camera with a fixed 300 mm f/4 telephoto lens or a Nikkor 80-400 mm zoom lens with image stabilizer (IS) was used for photography. The use of a high-quality digital camera provided the possibility of rapid data acquisition and reduced the time spent on image processing and archiving at the end of the survey season. The photographs were recorded at a high resolution setting in large RGB JPEG format. Video footage was recorded using a Canon Optura 20 miniDV digital video camera. Video footage was particularly important for documenting body condition characteristics of the whales (e.g., protruding scapulae, depressions behind the blowhole) that are often difficult to distinguish in a still photograph due to lighting features, timing, and position of the whale in the picture. Contact with a group of whales was maintained until all the individuals sighted had been photographed, if possible, or after approximately one hour, regardless of the number of aspects photographed, to avoid the potential for disturbing the animal over an extended time period. The zodiac then withdrew from the group of whales. These procedures were repeated each time additional whale groups were sighted and photographed. A sighting number was given to each of these encounters.

A "sighting" is defined as the observation and photographing of a single individual or group of two or more whales in direct proximity to each other (within 10 body

lengths) with coordinated dive and surfacing times and directions of movement relative to other individuals in the group.

Group size estimates were based on a consensus of the observers aboard the zodiac. A “calf” was defined as an individual up to one year old (current year’s offspring) as established by their small body size (about one-third a mature adult) and demonstrating a close association with a particular adult whale (Wells and Scott, 1990; Weller et al., 2004).

Images of individual gray whales consist of various aspects of the body: head, back flanks, and flukes. An attempt was made to photograph all aspects of each whale. Whales were photographed in sequence, from head to fluke on both the right and left sides, and the dorsal and ventral fluke surfaces. Priority was given to photographing the right and left sides of each whale, as fluking tendencies vary with individual behavior and foraging depth. Traditionally the right and left flanks have been considered for standard identification in Photo-ID of gray whales. The ventral surface of the flukes was considered as a supplemental view to aid in identification (Weller et al., 2002; Calambokidis et al., 2002; Yakovlev and Tyurneva 2005c).

Since the likelihood of repeated recognition of an individual (via matching) increases as more information for that individual is amassed in the catalogue, a fourth view – the dorsal fluke surface – was added as supplemental information for the identification process. The dorsal fluke surface of individual whales can often be displayed even in shallow feeding areas, when deeper diving may not be feasible. The method of adding aspects in an attempt to improve recognition accuracy, especially during the early years of data collection and catalogue preparation has been used successfully in work with other marine mammal species (McConkey, 1999; Bannister, 2000; Glockner-Ferrari and Ferrari, 2000).

After each Photo-ID mission was completed, the zodiac would return to the mother vessel. All the digital images were loaded into a notebook computer and a backup external hard disk from the camera memory cards and were archived on CD and DVD. The information recorded on data sheets was entered into a database in Excel format and also archived on external disks, CD and DVD. All digital data was stored on three different digital media at all times. All archival data CDs were also duplicated and the backups were stored at various offsite locations whenever possible.

### **Photo and Video Analysis**

An integrated database program was completed and implemented in 2005 to house both field notes and photographic data catalogues. Digital photographs of whales were processed for subsequent identification work within a structured, searchable, database structure. The best photographs of each sighting were compiled into a pre-catalogue portfolio. The database also generates annual and the master catalogue containing the most current and up-to-date photographs available.

Standard photographic matching procedures for pattern-based matching of flanks and flukes were followed as described in the International Whaling Commission



Special Issue No. 12 (Hammond et al., 1990). The process has been improved since that time by other specialists studying gray whales and other large whales (Weller et al., 2004; Calambokidis et al., 2002).

The following whale body areas (aspects) were selected to create the catalogue (in order of priority): right (RS) and left (LS) sides of the body, and dorsal ventral (VDF) and ventral dorsal (DVF) fluke surfaces. For each sighting, the photographs for that sighting and that daily mission (zodiac deployment from the base ship) were reviewed, and from all of the photographs of the same animal, the best photos were selected to be included in the annual pre-catalogue. Each new sighting was compared to previous sightings obtained during that year. If a match was made to an existing image, the photograph was grouped with other photographs of that individual.

After the photographs had been grouped by individual animals based on available aspects, the pictures were compared to the catalogue images for previous years, 2002, 2003 and 2004. It was decided during processing of the 2004 materials that in the event of the discovery of a new whale, if high-quality photographs of the right side of the individual were available, it would be assigned a new identification number. In the discovery of a left side only or the discovery of a left side with other aspects, but without the right side, the whale would be given a provisional number, until a corresponding right side photo could be confirmed. This process eliminates the possibility of discovering duplicate or composite whales that would need to be removed from the catalogue in the future. Identification numbers were not assigned on the basis of fluke photos that could not be matched to corresponding right or left side images of known whales.

All images were then cross compared to all of the “best” type- specimen photographs of existing whales from 2002, 2003 and 2004 to establish the recurrence of sightings of the same whales and to ensure that no duplicate whales were included in either the previous years’ catalogues or the current pre-catalogue.

All photos were rated on a five-tier system: excellent, good, fair, poor, and trash/other photographs. A confident match was not made unless the photographs were considered to be of good or excellent quality (poor-quality photographs were used for supplemental information only or were digitally archived for potential future use). Trash photos (or ‘other’ photos) are either place holding photos used to separate whale sightings in the field, or contain no gray whale information and are archived offsite.

Side to fluke matches were considered to be reliable when taken in sequential order, and when each successive frame contained parts of the animal visible in the previous frame. Digital photography greatly assisted during the side to fluke matching process.

Confident left to right side matches were established based on the following criteria: 1) the whale was photographed as a solitary individual; (2) two sequences were compared with flukes in common for a single sighting; and (3) as a final check to compare matches and assist with right to left matches, whale knuckle height,

spacing and ratios were considered (see Calambokidis et al., 1999). This process was conducted at least three times before left to right matches could be assigned a probability of 90% or higher, after which the images were transferred from the pre-catalogue to the annual catalogue. All whale sighting matches, as well as (a) right-left matches and (b) side-fluke matches, were verified by at least two identification specialists. Whale body pigmentation was the primary feature used to distinguish individuals, with scars and body markings supplementing the matching process.

To avoid composite whales, beginning in 2004, whales identified only by the left side are given provisional numbers (temp IDs) RGW0QN for further identification. These whales are not placed in the master catalogue but are only included in the annual catalogue and are considered as having been sighted in the annual report. This procedure for designation of temporary identifiers and classification of whale sides and flukes is generally accepted among Photo-ID experts throughout the world and has been adapted for our procedures (Calambokidis et al., 1994, 2002; Clapham et al., 1993; Weller et al., 1999, 2000).

If the annual pre-catalogue matching appeared reliable, the whales would be given permanent identification numbers and transferred to the final catalogue. After the annual catalogue was complete, discrepancies between the current catalogue and the main catalogue were corrected. Then any new information and photographs obtained during the last expedition were added to the main catalogue. Special attention was devoted to identifying whales with various deviations from the “physiological norm,” including: (1) dividing whales with deviations in body physical conditions (BC) into categories; and (2) whales with obvious sloughing of skin.

Complete analysis of video footage had not been performed at the time this report was prepared. Video data to date has only been used as an ancillary aid to assist in solving any discrepancies with whale sightings and questions about body condition.

## **RESULTS**

### **Scope of Work**

Photography and video photography of whales were conducted on the zodiac from the base vessels *Akademik Lavrentyev* and *Akademik Oparin* from July 14 to October 1, 2005. The effectiveness of the Photo-ID team was largely dependent on weather conditions. Work effort was often separated not only by periods of vessel travel to research sites, by storm layovers and time dedicated to other scientific studies

The breakdown of time spent by the expedition aboard the vessels in 2005 was as follows: out of the 88 days of the voyages (from July 12 to October 7), 75 were working days; 8 were travel days; and 5 were storm shelter days.

A survey day was counted if any whale (or group of whales) was photographed, from either the zodiac or main vessel deck, either during a dedicated Photo-ID survey or opportunistically while the mother vessel was anchored performing other research

tasks. A 'survey day' is therefore not quantitative measure of survey effort. Whales were photographed from a zodiac on a total of 32 days. Combined data from a number of years regarding the breakdown of time spent on Photo-ID work in the study of whales are given in Table 1.

Table 1. Photo-ID effort (days) during expeditions to Sakhalin Island, 2002-2005.

| Year | Dates         | Duration of expedition (days) | Number of working days | Travel time (days)            | Storm shelter time (days) | PhotoID days (from zodiac/ zodiac + vessel deck) | Number of missions | Number of sightings from zodiac/ vessel deck | Number of identified whales from zodiac/ vessel deck | Total number of whale photos |
|------|---------------|-------------------------------|------------------------|-------------------------------|---------------------------|--|--------------------|--|--|------------------------------|
| 2002 | 30.08.-25.10  | 57                            | 27                     | 17 (for storm escape)         | 11                        | 13/-   | 24                 | 72 / -                                       | 93 / -   | 2602                         |
| 2003 | 21.07 - 27.09 | 69                            | 40                     | 16 (for Nikolaevs k-na-Amure) | 13                        | 17 / 22  | 35                 | 86 / 36                                      | 146 / 37   | 7482                         |
| 2004 | 30.07 - 07.10 | 70                            | 56                     | 9 (2 day leg in storm)        | 5                         | 16 /24   | 27                 | 113 / 57                                     | 209 / 57   | 9647                         |
| 2005 | 12.07 - 07.10 | 88                            | 75                     | 8 (2 day leg in storm)        | 5                         | 32 /-  | 56                 | 186 / -                                      | 453 / -  | 16180                        |

To determine overall scope of work we combined the data for photoID work conducted from the zodiac. The scope of work and Photo-ID effort for field work along the Sakhalin Island shelf is shown in Tables 2 and Appendices A1 and A2.

Table 2. Photo-ID effort in 2005: time spent and numbers of photographs taken from the zodiac.

| N  | Date      | Number of zodiac mission per day | Duration of each mission in h:min. |           |           |           |               | Number of pictures GW from zodiac |           |           |           |       |
|----|-----------|----------------------------------|------------------------------------|-----------|-----------|-----------|---------------|-----------------------------------|-----------|-----------|-----------|-------|
|    |           |                                  | mission 1                          | mission 2 | mission 3 | mission 4 | Total         | mission 1                         | mission 2 | mission 3 | mission 4 | Total |
| 1  | 7/14/2005 | 1                                | 4:17                               |           |           |           | 4:17          | 447                               |           |           |           | 447   |
| 2  | 7/17/2005 | 1                                | 4:09                               |           |           |           | 4:09          | 891                               |           |           |           | 891   |
| 3  | 7/22/2005 | 1                                | 1:10                               |           |           |           | 1:10          | 0                                 |           |           |           | 0     |
| 4  | 7/23/2005 | 2                                | 1:05                               | 1:10      |           |           | 2:15          | 64                                | 136       |           |           | 200   |
| 5  | 7/24/2005 | 3                                | 0:35                               | 1:10      | 1:00      |           | 2:45          | 52                                | 248       | 166       |           | 466   |
| 6  | 7/26/2005 | 2                                | 3:00                               | 4:50      |           |           | 7:50          | 508                               | 1085      |           |           | 1593  |
| 7  | 7/27/2005 | 2                                | 2:50                               | 2:05      |           |           | 4:55          | 422                               | 278       |           |           | 700   |
| 8  | 7/29/2005 | 2                                | 2:20                               | 2:40      |           |           | 5:00          | 274                               | 577       |           |           | 851   |
| 9  | 8/7/2005  | 2                                | 2:40                               | 1:40      |           |           | 4:20          | 135                               | 529       |           |           | 664   |
| 10 | 8/8/2005  | 2                                | 3:10                               | 1:10      |           |           | 4:20          | 461                               | 99        |           |           | 560   |
| 11 | 8/9/2005  | 2                                | 1:09                               | 1:25      |           |           | 2:34          | 119                               | 111       |           |           | 230   |
| 12 | 8/11/2005 | 1                                | 1:15                               |           |           |           | 1:15          | 150                               |           |           |           | 150   |
| 13 | 8/16/2005 | 1                                | 1:20                               |           |           |           | 1:20          | 226                               |           |           |           | 226   |
| 14 | 8/18/2005 | 1                                | 0:25                               |           |           |           | 0:25          | 43                                |           |           |           | 43    |
| 15 | 8/20/2005 | 3                                | 2:20                               | 3:00      | 1:10      |           | 6:30          | 513                               | 570       | 80        |           | 1163  |
| 16 | 8/21/2005 | 1                                | 3:15                               |           |           |           | 3:15          | 527                               |           |           |           | 527   |
| 17 | 8/23/2005 | 2                                | 0:35                               | 2:10      |           |           | 2:45          | 57                                | 395       |           |           | 452   |
| 18 | 8/24/2005 | 2                                | 0:55                               | 3:21      |           |           | 4:16          | 184                               | 360       |           |           | 544   |
| 19 | 8/25/2005 | 4                                | 0:55                               | 1:35      | 2:30      | 2:30      | 7:30          | 133                               | 365       | 359       | 324       | 1181  |
| 20 | 8/31/2005 | 1                                | 1:00                               |           |           |           | 1:00          | 2                                 |           |           |           | 2     |
| 21 | 9/1/2005  | 3                                | 1:20                               | 1:30      | 1:15      |           | 4:05          | 93                                | 382       | 122       |           | 597   |
| 22 | 9/6/2005  | 1                                | 0:40*                              |           |           |           | 0:40          | 39                                |           |           |           | 39    |
| 23 | 9/7/2005  | 1                                | 1:05                               |           |           |           | 1:05          | 189                               |           |           |           | 189   |
| 24 | 9/8/2005  | 2                                | 1:49                               | 2:05      |           |           | 3:54          | 377                               | 83        |           |           | 460   |
| 25 | 9/9/2005  | 1                                | 0:55                               |           |           |           | 0:55          | 66                                |           |           |           | 66    |
| 26 | 9/16/2005 | 1                                | 0:42                               |           |           |           | 0:42          | 74                                |           |           |           | 74    |
| 27 | 9/20/2005 | 1                                | 0:49                               |           |           |           | 0:49          | 38                                |           |           |           | 38    |
| 28 | 9/22/2005 | 2                                | 1:50                               | 2:31      |           |           | 4:21          | 283                               | 235       |           |           | 518   |
| 29 | 9/23/2005 | 1                                | 1:59*                              |           |           |           | 1:59          | 86                                |           |           |           | 86    |
| 30 | 9/24/2005 | 2                                | 1:10                               | 1:30      |           |           | 2:40          | 85                                | 398       |           |           | 483   |
| 31 | 9/25/2005 | 3                                | 5:00                               | 2:20      | 2:37      |           | 9:57          | 1135                              | 190       | 644       |           | 1969  |
| 32 | 10/1/2005 | 2                                | 1:40                               | 2:50      |           |           | 4:30          | 119                               | 652       |           |           | 771   |
|    | total:    | 56                               |                                    |           |           |           | 107 hr 28 min |                                   |           |           |           | 16180 |

\* Highlighted areas represent offshore area sighting

The additional expedition time in 2005 provided additional time for photography, which enhanced the overall catalogue as well as improved resighting statistics. In

2005 the work also became more efficient due to new knowledge and experience obtained in the course of previous field studies in 2002-2004.

Large numbers of photos were taken at each whale sighting and the supplemental photos became useful matching aids in the photo lab, and have dramatically improved the likelihood of matching any given photograph to the catalogue. These additional photographs of individual flukes and various body parts without the characteristic dorsal hump in the center of the image (the standard Photo-ID shot) could then be matched with whale aspects that were not seen in previous years. This improved the effectiveness of each whale mission and increasing the likelihood of accurate identification.

Table 3. Descriptive statistics of Photo-ID work from the zodiac on the northeast shelf of Sakhalin Island (field data), 2005.

| Item | Parameters                                       | Piltun area | Offshore area | Total |
|------|--|-------------|---------------|-------|
| 1    | Number of days photographing whales              | 30          | 2             | 32    |
| 2    | Number of sightings                              | 184         | 2             | 186   |
| 3    | Total number of whales sighted                   | 450         | 3             | 453   |
| 4    | Average number of whales sighted per survey day  | 15          | 1.5           | 14.2  |
| 5    | Average number of whales sighted per sighting    | 2.4         | 1.5           | 2.4   |
| 6    | Total duration of sightings in minutes           | 3568        | 107           | 3675  |
| 7    | Average sighting duration in minutes             | 19.4        | 53.5          | 19.7  |
| 8    | Number of whale photographs                      | 16055       | 125           | 16180 |
| 9    | Average number of whale photographs per day      | 535.2       | 62.5          | 505.6 |
| 10   | Average number of whale photographs per sighting | 87.3        | 62.5          | 87    |
| 11   | Average number of photographs per sighted whale  | 35.7        | 41.7          | 35.7  |

#### *Photo-ID from the Zodiac*

In 2005, whales were photographed on 32 days from the zodiac; 30 days in the Piltun area and 2 days in the Offshore feeding area. The photographic survey work on 8 and 9 September consisted of two missions (launch of the zodiac from the vessel to photograph whales); both photographic missions were conducted at the new whale sighting location in Severny Bay, beyond Cape Elizabeth. In 2005, 16,055 whale photographs were taken from the zodiac in the Piltun area, and 125 photographs were taken in the Offshore feeding area.

Combined data of photographic characteristics, effort, and other characteristics of the surveys are given in Tables 1, 2, 3 and Appendices A1 and A2. Depths were measured from the zodiac at whale diving points (Table 4).

Table 4. Depths recorded from the zodiac during Photo-ID, 2005.

| Item  | Date      | Depths taken from zodiac at each sighting (meters) |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | Average depth (Piltun area) | Average depth (Offshore area) | Average depth (Cape Elizabeth) |
|---|-----------|--|----|----|-----|-----|-----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------------|-------------------------------|--------------------------------|
|   |           | N1   | N2 | N3 | N4  | N5  | N6  | N7  | N8 | N9 | N10 | N11 | N12 | N13 | N14 | N15 | N16 | N17 | N18 | N19 | N20 | N21 | N22 | N23 |                             |                               |                                |
| 1   | 7/14/2005 | 14   | 13 | 14 | 13  | 10  | 12  | 13  | 13 | 13 | 14  | 13  |     |     |     |     |     |     |     |     |     |     |     |     | 12.91                       |                               |                                |
| 2   | 7/17/2005 | 6  | 10 | 12 | 13  | 13  | 9   | 11  | 10 | 5  | 10  | 17  |     |     |     |     |     |     |     |     |     |     |     |     | 10.55                       |                               |                                |
| 3   | 7/22/2005 | n/p  |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |                               |                                |
| 4   | 7/23/2005 | 13   | 7  |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 10.00                       |                               |                                |
| 5   | 7/24/2005 | 14   | 19 | 14 |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 15.67                       |                               |                                |
| 6   | 7/26/2005 | 15   | 16 | 14 | 15  | 5   | 4   | 4   | 15 | 12 | 7   | 10  | 4   | 6   | 6   | 14  | 17  |     |     |     |     |     |     |     | 10.25                       |                               |                                |
| 7   | 7/27/2005 | 6  | 7  | 7  | 14  | 12  | 14  | 11  | 10 | 10 |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 10.11                       |                               |                                |
| 8   | 7/29/2005 | 12   | 12 | 11 | 7   | 5   | 10  | 25  | 20 | 6  | 11  | 26  |     |     |     |     |     |     |     |     |     |     |     |     | 13.18                       |                               |                                |
| 9   | 8/7/2005  | 13   | 18 | 30 | 25  | 25  |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 22.20                       |                               |                                |
| 10  | 8/8/2005  | 19   | 19 | 21 | 10  | 12  |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 16.20                       |                               |                                |
| 11  | 8/9/2005  | 12   | 16 | 15 |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 14.33                       |                               |                                |
| 12  | 8/11/2005 | 11   | 13 |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 12.00                       |                               |                                |
| 13  | 8/16/2005 | 14   | 11 |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 12.50                       |                               |                                |
| 14  | 8/18/2005 | 15   |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 15.00                       |                               |                                |
| 15  | 8/20/2005 | 6  | 8  | 15 | 11  | 15  | 18  | 20  | 22 | 17 | 15  | 10  | 19  | 26  | 32  | 20  |     |     |     |     |     |     |     |     | 16.93                       |                               |                                |
| 16  | 8/21/2005 | 20   | 32 | 12 | n/d | n/d | n/d | n/d |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 21.33                       |                               |                                |
| 17  | 8/23/2005 | 10   | 10 | 15 | 13  | 14  | 18  | 8   |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 12.57                       |                               |                                |
| 18  | 8/24/2005 | 14   | 15 | 15 | 8   | 9   | 17  | 12  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 12.86                       |                               |                                |
| 19  | 8/25/2005 | 18   | 20 | 18 | 15  | 17  | 22  | 16  | 10 | 13 | 24  | 27  | 14  | 11  |     |     |     |     |     |     |     |     |     |     | 17.31                       |                               |                                |
| 20  | 8/31/2005 | 22   |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 22.00                       |                               |                                |
| 21  | 9/1/2005  | 32   | 10 | 13 | 12  | 4   | 15  |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 14.33                       |                               |                                |
| 22  | 9/6/2005  | 36   |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |                               |                                |
| 23  | 9/7/2005  | 23   |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 23.00                       | 36.00                         |                                |
| 24  | 9/8/2005  | 34   | 39 |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 34.00                       |                               | 39                             |
| 25  | 9/9/2005  | 38   |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |                               | 38                             |
| 26  | 9/16/2005 | 16   | 6  |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 11.00                       |                               |                                |
| 27  | 9/20/2005 | 7  |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 7.00                        |                               |                                |
| 28  | 9/22/2005 | 6  | 16 | 13 | 12  | 6   | 7   | 11  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 10.14                       |                               |                                |
| 29  | 9/23/2005 | 48   |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                             |                               |                                |
| 30  | 9/24/2005 | 10   | 13 | 22 | 6   |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 12.75                       | 48.00                         |                                |
| 31  | 9/25/2005 | 8  | 10 | 6  | 9   | 14  | 22  | 14  | 5  | 7  | 12  | 19  | 12  | 8   | 9   | 9   | 12  | 12  | 7   | 15  | 9   | 13  | 6   | 12  | 10.87                       |                               |                                |
| 32  | 10/1/2005 | 20   | 23 | 9  | 14  | 7   | 6   |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 13.17                       |                               |                                |
| Average for each area where whales were sighted |           |  |    |    |     |     |     |     |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 14.79                       | 42.00                         | 38.5                           |

Data pertaining to whales identified during previous study years are of interest, since they provide more extensive and precise information about specific animals. Data on the numbers of whales identified in four years of studies are given in Table 5.

Table 5. Numbers of whales identified, 2002–2005.

| Year | Number of whales (total for year) | From 2002 | From 2003 | From 2004 | Number of new whales for year | Number of whales from previous years not sighted in current year | Number of whales in catalogue |
|------|-----------------------------------|-----------|-----------|-----------|-------------------------------|--|-------------------------------|
| A    | B=C+D+E+F                         | C         | D         | E         | F                             | G  | G = B+G                       |
| 2002 | 46                                |           |           |           | 46                            |  | 46                            |
| 2003 | 82                                | 32        |           |           | 50                            | 14   | 96                            |
| 2004 | 96                                | 38        | 33        |           | 25                            | 25   | 121                           |
| 2005 | 113                               | 40        | 36        | 20        | 17                            | 25   | 138                           |

Photographing all four aspects of the whales proved extremely useful, not only for creating the pre-catalogue of whales photographed for the first time in 2005, but also for updating the images of whales in the final master catalogue: (1) with additional aspects that were not photographed in 2002 - 2004; and (2) with photographs showing any changes in body markings that had occurred during the study years, such as the appearance or disappearance of scars, camouflaging of natural pigmentation by rock barnacle spots, etc. Every year we obtain a more comprehensive description of each animal and a more comprehensive catalogue of the gray whales of the Korean-Okhotsk population. This annual updating of the catalogue will aid in streamlining the matching process as the number of known individuals in the catalogue increases each year, and the annual discovery rate of new animals declines. The capture of all four aspects of each individual (right side, left side, dorsal fluke, and ventral fluke) also increases each year as more photographs are added to the catalogue. Tables 6 and Appendix Table A3 present data for all the study years and the total number of aspects captured per individual for all study years.

Table 6. Assessment of the comprehensiveness of data on the numbers of aspects of gray whales identified, 2002 to 2005.

| Year      |        | # Aspects Photographed |        |        |        | Total # whales |
|-----------|--------|------------------------|--------|--------|--------|----------------|
|           |        | 4                      | 3      | 2      | 1      |                |
| 2002      | number | 17                     | 3      | 9      | 17     | 46             |
|           | %      | 36,96%                 | 6,52%  | 19,57% | 36,96% |                |
| 2003      | number | 39                     | 11     | 23     | 8      | 81             |
|           | %      | 48,15%                 | 13,58% | 28,40% | 9,88%  |                |
| 2004      | number | 51                     | 12     | 27     | 6      | 96             |
|           | %      | 53,13%                 | 12,50% | 28,13% | 6,25%  |                |
| 2005      | number | 53                     | 13     | 45     | 2      | 113            |
|           | %      | 46,90%                 | 11,50% | 39,82% | 1,77%  |                |
| 2002-2005 | number | 87                     | 6      | 39     | 6 *    | 138            |
|           | %      | 63,04%                 | 4,35%  | 28,26% | 4,35%  |                |

\* Of these 6 whales in the catalogue that have only one photographed aspect, 3 individuals have a right side only photo, and 3 individuals have a left side only photo

Calves rarely showed their flukes, hence only their sides generally were photographed (Yakovlev and Tyurneva, 2003). No cow/calf pairs were observed in the Offshore area during any of the study years. It has been noted that whales feeding in deeper waters show their flukes more frequently than whales in the shallow-water Piltun area.

A comparison of the study results from 2002 – 2005 indicates that a more complete capture (all four aspects) of each individual whale was photographed in 2005 than in previous years (Tables 6, Appendix 3), despite the fact that the survey was conducted primarily in the Piltun area, where flukes are rarely seen. This was very likely due to the additional experience of the zodiac driver and the photographer, better weather conditions during the season, a longer field season and, as mentioned previously, upgraded equipment that all resulted in more photograph days, more whale sightings and more photographs (see Table 1)..

### Group Sizes and Distribution

The 2005 studies were distinguished from the studies of previous years by a significant increase in the proportion of observations conducted in the Piltun area (Tables 2 and 3, and Appendices A1 and A2). Only two days were spent in the Offshore area during the entire survey period, during which photography from the zodiac was conducted, and 3 individual whales were photographed. During the entire survey period, we were able to identify only 3 individual whales in the Offshore area, 2 of which were also sighted in the Piltun area in 2005. One whale was described as new and was sighted once during the season, only in the Offshore area. The presence of whales was also discovered in two areas new to us.

In the first area, north of the city of Okha, four whales were identified, of which one was new to the catalogue and had been seen earlier in the season in the Piltun area. Two whales from this group were observed in the Piltun area earlier and later in the season and also had been sighted in the Piltun and Offshore feeding areas during



previous years. One animal of the group, first identified in 2002, was sighted once in 2005 in the new (North) area.

In the second area, west of Cape Elizabeth in Severny bay, two whales were sighted, but only one could be photographed and identified. It proved to be new to the catalogue and was not observed in the Piltun or Offshore feeding area during this season (Fig. A1, Appendix). The sighting data of whales in the various areas for all the study years are presented in Table 7 and Appendices A4 and A6.

Table 7. Movement of whales between feeding areas, 2002 to 2005.

| Year | Number of individual whales sighted in Piltun area | Number of individual whales sighted in Offshore area | Number of individual whales sighted in both Piltun and Offshore areas | Number of individual whales sighted in northern (new) areas | Number of individual whales sighted in both northern and Piltun/Offshore area |
|------|--|--|---|---|---|
| 2002 | 13   | 35   | 1   |   |   |
| 2003 | 51   | 34   | 4   |   |   |
| 2004 | 95   | 8  | 6   |   |   |
| 2005 | 110  | 3  | 2   | 5   | 3   |

In 2005, the group size of sighted whales differed when compared to previous years data. Comparative data obtained in studies conducted only from the zodiac are presented in Table 8, Fig. 1 and Appendix A5).

Table 8. Gray whale group size and encounter rates in 2003-2005 compared geographically by feeding area.

| Group Size     | Groups sighted in 2003 | % sighted in 2003 | Groups sighted in 2004 | % sighted in 2004 | Groups sighted in 2005 | % sighted in 2005 |
|----------------|------------------------|-------------------|------------------------|-------------------|------------------------|-------------------|
| Both areas     |                        |                   |                        |                   |                        |                   |
| 1              | 58                     | 48.33             | 55                     | 50.93             | 52                     | 28.11             |
| 2              | 38                     | 31.67             | 28                     | 25.93             | 57                     | 30.81             |
| 3              | 18                     | 15                | 14                     |                   | 37                     | 20.00             |
| 4              | 4                      | 3.33              | 7                      |                   | 25                     | 13.51             |
| 5              | 2                      | 1.67              | 1                      | 0.93              | 10                     | 5.41              |
| 6              | 0                      | 0                 | 1                      | 0.93              | 2                      | 1.08              |
| 7              | 0                      | 0                 | 1                      | 0.93              | 1                      | 0.54              |
| 8              | 0                      | 0                 | 1                      | 0.93              | 1                      | 0.54              |
| Total:         | 120                    |                   | 108                    |                   | 185                    |                   |
| Offshore area  |                        |                   |                        |                   |                        |                   |
| 1              | 33                     | 56.89             | 4                      | 100               | 1                      | 50                |
| 2              | 13                     | 22.41             |                        |                   | 1                      | 50                |
| 3              | 10                     | 17.24             |                        |                   |                        |                   |
| 4              | 2                      | 3.44              |                        |                   |                        |                   |
| 5              | 0                      | 0                 |                        |                   |                        |                   |
| Total:         | 58                     |                   | 4                      |                   | 2                      |                   |
| Piltun area    |                        |                   |                        |                   |                        |                   |
| 1              | 25                     | 40.32             | 51                     | 50.00             | 51                     | 28.02             |
| 2              | 25                     | 40.32             | 28                     | 26.42             | 56                     | 30.77             |
| 3              | 8                      | 12.9              | 14                     | 13.21             | 37                     | 20.33             |
| 4              | 2                      | 3.22              | 7                      |                   | 24                     | 13.19             |
| 5              | 2                      | 3.22              | 1                      | 0.94              | 10                     | 5.49              |
| 6              | 0                      | 0                 | 1                      | 0.94              | 2                      | 1.10              |
| 7              | 0                      | 0                 | 1                      | 0.94              | 1                      | 0.55              |
| 8              | 0                      | 0                 | 1                      | 0.94              | 1                      | 0.55              |
| Total:         | 62                     |                   | 104                    |                   | 182                    |                   |
| Cape Elizabeth |                        |                   |                        |                   |                        |                   |
| 1              |                        |                   |                        |                   | 1                      | 50                |
| 2              |                        |                   |                        |                   | 1                      | 50                |
| 3              |                        |                   |                        |                   |                        |                   |
| 4              |                        |                   |                        |                   |                        |                   |
| Total:         |                        |                   |                        |                   | 2                      |                   |
| North          |                        |                   |                        |                   |                        |                   |
| 1              |                        |                   |                        |                   |                        |                   |
| 2              |                        |                   |                        |                   |                        |                   |
| 3              |                        |                   |                        |                   |                        |                   |
| 4              |                        |                   |                        |                   | 4                      | 100               |
| Total:         |                        |                   |                        |                   | 4                      |                   |

\*Numbers reflect groups of whales photographed from the zodiac only.

Average group size in 2003 -1.78

Average group size in 2004 -1.92

Average group size in 2005 -2.45

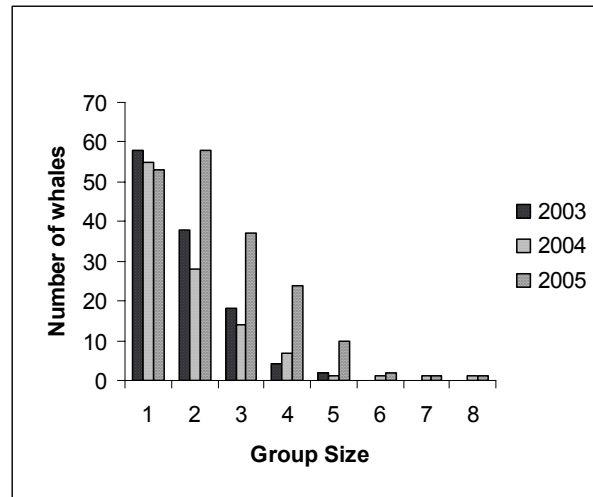


Fig. 1. Annual variation in the group size of gray whales sighted from the zodiac on the northeast shelf of Sakhalin Island (field data).

The average depth at locations where whales were photographed was 16.47 m (a range of 5 to 36 m) in the Piltun area, 51.24 m (a range of 30 – 52 m) in the Offshore area, 39 m in the north, and 38 m beyond Cape Elizabeth (Table 4). The sighting points are shown in Figure 1.

### Sightings and Identified Whales

Between 14 July 14 and 1 October 2005 (32 Photo-ID working days), there were 186 encounters (sightings) with 453 gray whales, of which 326 whales were identified, including repeat sightings (Table 3 and Tables A4, A5 and A6 in the Appendix). Of these, 317 whales were sighted in the Piltun area, 3 in the Offshore area, 4 in the area north of the city of Okha (North), and 2 beyond Cape Elizabeth, in Severny Bay. During the laboratory identification process where repeated sightings were excluded, a total of 110 and 3 gray whales were identified in the Piltun and Offshore feeding areas, respectively, 4 in the North area, and 1 at the Cape Elizabeth site. Two animals sighted in the Offshore area were also seen in the Piltun area during the season, three from the North area were also recorded in the Piltun area during the season, and a whale sighted beyond Cape Elizabeth was new to the catalogue and was sighted only once and only in that area. This resulted in a total of 113 different whales being identified in 2005 from zodiac operations. A total of 138 whales have now been identified during the missions in 2002 – 2005 (Tables 5, 7; Appendices A4 and A6).

### Repeat Sightings, Site Fidelity and Association Patterns

The following repeat sightings of identified whales were noted during the study period in 2005; data are given in Table 9).

Table 9. Frequency of repeat sightings of Photo-IDentified gray whales in 2005.

| Number of re-sightings for any individual within the 2005 season | Number of whales re-sighted the indicated number of times | Total whale sightings |
|--|---|-----------------------|
| 1  | 19  | 19                    |
| 2  | 36  | 72                    |
| 3  | 22  | 66                    |
| 4  | 21  | 84                    |
| 5  | 9   | 45                    |
| 6  | 24  | 144                   |
| 7  | 1   | 7                     |
| 8  |   |                       |
| 9  | 1   | 9                     |

Analysis of the inter- and intra-year frequency of sightings of identified whales in 2002 – 2005 is of great interest; data are given in Tables 10 and Appendices A5 and A6.

Table 10. Inter- and intra-year frequency of sightings of identified gray whales (IDW), 2002-2005.

| Year                               | 2002 | 2003 | 2004 | 2005 |
|------------------------------------|------|------|------|------|
| Number of sightings of IDW         | 66   | 154  | 228  | 326  |
| Number of IDW                      | 47   | 81   | 96   | 113  |
| Average frequency of IDW sightings | 1.40 | 1.90 | 2.38 | 2.88 |

The presence or absence of whales by months in 2002 – 2005 is shown in Appendix A6.

As we can see from the examples given, repeat sightings of whales and photographing of whales over the course of a day, as well as sightings of the same whales over the course of a season, also provide important data on the habitat use of the whales within their feeding areas and the dynamics of their visits to these areas.

### **Whale Movement between Piltun and Offshore Feeding Areas**

The discovery of a second main feeding area offshore from Chayvo Bay in 2001 (Maminov and Yakovlev, 2002) allowed us to observe and describe the nature of the movement of animals between the Piltun area and the Offshore area. The frequency of repeat sightings of identified individual whales during the entire survey period is important in determining the extent of the movement of whales between these two regions (see Tables 7, 8, and Appendix A4). During the 2005 expedition, during the

trip north to Cape Elizabeth aboard the research vessel *Akademik Oparin* to shelter from a storm beyond Cape Elizabeth, small groups of gray whales were observed in locations where they had never been seen in previous years (Fig. A1). Benthos studies were performed at the points where the whales were sighted, and they were photographed from a zodiac for identification purposes.

According to our data from 2002, only one whale was observed in both the Piltun and Offshore feeding areas in the same season.

In 2002 and 2003, 11 individuals changed feeding areas between seasons, and of these, 4 whales were observed in both areas during the same season. The whales observed in the Offshore area in 2002 included cows that were observed with calves in the Piltun area in 2003 (Appendices A4, A6). For all the study years (2002-2005), there have been 51 whales identified using both feeding areas during one year and between years (Appendices A4, A6).

A more precise understanding and statistical substantiation of the movement of whales both within one feeding area and between areas and the conditions of the use of the feeding areas can be obtained only after the accumulation of data in further studies.

### **Cow/Calf Pairs**

In addition to monitoring the size of this population, it is very important to determine the number of cows with calves and indirectly determine their health status through external physical indicators such as body weight and skin condition.

Due to the late start of the photographic surveys in 2004, we managed to identify with certainty only two cow/calf pairs which had not separated by mid-September. Of the two calves identified, neither was sighted in 2005. However, during the 2005 surveys, that at least four yearling calves were observed that were also observed in 2004 but at that time not identified as new calves because they were not sighted together with their mothers. They were identified as yearlings in 2005 by photographs. They stayed together with adult animals, were distinguished by their small size and exhibited playful behavior, often showing their heads, which resembled the short rostrums of juveniles. At first they were mistaken to be 2005 calves, but it was discovered later that they had been seen for the first time the previous year, in 2004. They all looked healthy and did not display signs of emaciation.

In 2005 we managed to identify four pairs of cows with calves were identified, which separated during August and were sighted separately in September (Appendix A7). For example, RGW005-cow and RGW133-calf were observed together for the last time on August 8. RGW039-cow and RGW135 were observed together for the last time on August 16. All the mothers and calves of 2005 were already observed separately and in different groups in September (Appendices A6 and A7).

Of the four cows identified with calves in the Sakhalin area in 2005, three had been recorded as cows with calves in 2003 (Appendix A6).

We had the opportunity in 2005 to track the condition of animals that had been recorded as cows with calves in 2004. The condition of the calves identified from 2004 could not be tracked due to the lack of 2005 sightings. Comparative data are presented in Table 11.

Table 11. Inter-year comparison of the status of cows and calves from 2004 sighted in 2005.

| Mother calf    | Number of mother/calves 2004 | Number of mother/calves in 2004 with deficient BC <sup>1</sup> | Number of mother/calves in 2005 from 2004 | Changes in BC identified from 2004 as of 2005 |                 |
|----------------|------------------------------|--|---|---|-----------------|
|                |                              |  |   | BC improvement                                | BC not improved |
| Mother in 2004 | 2                            | 2  | 1   | 1   | 1               |
| Calf in 2004   | 2                            | 0  | 0   | 0   | 0               |

<sup>1</sup>BC = body condition

The table shows that one mother with low body condition in 2004 (class 3) was sighted in 2005 with an improved condition (class 0). Another mother with a body condition of class 2 in 2004, was still in the same condition in 2005 (Appendix A6).

## ***Physical Condition***

### **Body Weight**

It was observed during data processing in 2003 that several whales appeared visibly thinner than expected after wintering. A hierarchic system for classifying the degree of emaciation of whales was developed based on the original procedure created by Weller et al. (Weller et al., 2001). A whale is considered to have a deficient body condition if it has one or more of the following features:

- an obvious subdermal protrusion of the scapulae from the body with associated thoracic depressions at the anterior and posterior insertions of the pectoral flipper;
- the presence of noticeable depressions around the blowhole and head with a post-cranial “hump” on the dorsal surface;
- a pronounced ridge of lumbar and caudal vertebrae along the spine giving the body a bell shape (frontal view) with bulging along the lateral flanks;
- the presence of protruding ribs and vertebrae along the dorsal surface and/or lateral flanks or ribcage.

If any one or more of the above criteria were observed and noted in photographs or video data, the subject animal was classified based on the body condition as of the time of that sighting. The final classification given to a subject animal is the highest class number associated with that animal based on analysis of available

photographs for that sighting. The body condition classes for whales are defined as follows:

- class 0: standard body condition whale shows none of the four criteria listed above;
- class I: whale shows any of the four criteria listed above to a mild degree, but not more than two criteria;
- class II: whale shows any of the four criteria listed above to a moderate degree, but not more than two criteria;
- class III: whale shows more than two of the four criteria listed above to a moderate degree or whale shows any of the four criteria listed above to an extreme degree, but not more than two criteria;
- class IV: whale shows more than two of the four criteria listed above to an extreme degree.

The subjective terminology of “mild,” “moderate” and “extreme” degrees of the criteria was agreed upon within the Photo-ID team by comparison of photographic and video samples.

Table 12. Numbers of gray whales and associated body condition (BC) classes observed in 2003-2005.

| BC classes | Number of whales in each BC class in 2003 | % of whales in each BC class in 2003 | Number of whales in each BC class in 2004 | % of whales in each BC class in 2004 | Number of whales in each BC class in 2005 | % of whales in each BC class in 2005 |
|------------|---|--------------------------------------|---|--------------------------------------|---|--------------------------------------|
| 0          | 60  | 74.1                                 | 70  | 72.9                                 | 95  | 84.1                                 |
| 1          | 6   | 7.4                                  | 15  | 15.6                                 | 8   | 7.1                                  |
| 2          | 12  | 14.8                                 | 8   | 8.3                                  | 5   | 4.42                                 |
| 3          | 2   | 2.5                                  | 3   | 3.1                                  | 2   | 1.8                                  |
| 4          | 1   | 1.2                                  | 0   | 0                                    | 3   | 2.7                                  |

Due to the longer survey period in 2005 more resightings of whales occurred and allowed us to observe potential changes in the body condition of identified whales. It was discovered that for most of the underweight whales sighted during the season, their body condition index improved over the course of the season. The data presented in Table 12 for 2005 are based on data for the last sighting of the season;

i.e., if an animal was observed with a higher BC class during the first sightings, and the indices improved in subsequent sightings, we used the latest data in calculating the total number of underweight whales. During the period from 14 July to 1 October, 27 animals improved their BC class (Appendices A6 and A7, Fig. 2).

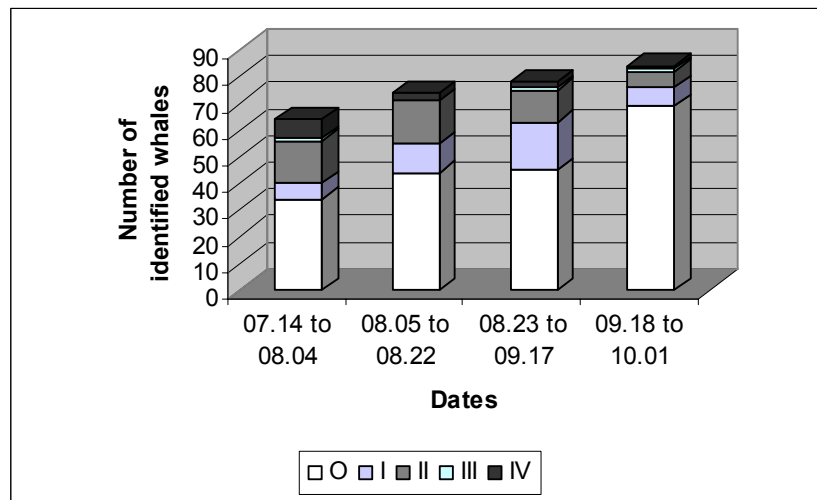


Fig. 2. Numbers of gray whales in body condition (BC) classes, northeast coast of Sakhalin Island, 2005.

In most cases, whales assigned to class I were considered to be within normal body weight limits for migrating and seasonally foraging populations. When we calculated the percentage of thin whales in relationship to the total number of animals observed, class I was therefore disregarded. Hence underweight animals (class II or higher) identified in 2005 made up 8.85% of the total number of whales identified (10 of 113), and 4 of them were nursing cows. Underweight animals (class II or higher) identified in 2004 made up 11.46% of the total number of individuals identified (11 of 96). Thin whales (class II or higher) in 2003 made up 18.52% (15 of 81) of the total number of individuals considered (Appendix A7).. A comparison of the numbers of identified whales that changed their body condition classes from 2004 to 2005 is outlined in Table 13.

Table 13. Inter-year comparison of body condition of whales sighted in 2004 and 2005 with sub-optimal body condition.

| Description of body physical condition   | Whales |
|--|--------|
| Condition improved                       | 20     |
| Condition deteriorated                   | 11     |
| Sub-optimal and condition did not change | 4      |

All calves were classified as class 0 (Appendix A7).



## Skin Sloughing

In 2005, despite the early start of the surveys and the large number of survey days conducted in the Piltun area, we were unable to track the process of sloughing, similar to the process observed in 2003, when the signs of shedding appeared and disappeared within a few days (Tyurneva and Yakovlev, 2005). During processing of photos, we found four whales with similar skin condition in stage 1-2, but we were unable to determine the start and end of the process due to the lack of re-sightings.

During the processing of Photo-ID data for 2003, skin sloughing that had not been observed in 2002 was noted in nine 9 whales (Appendix A7). With the exception of 1 animal, all the whales with various degrees of skin sloughing were observed in the Piltun area. Some whales were encountered over a period of several days. Skin sloughing appeared to begin at the dorsal ridge in two cases. Skin sloughing progressed noticeably on one whale in a single day, from 24 August to 25 August 2003. The whale was observed a few days later with no sign of skin sloughing. The picture was similar for another whale. This sloughing or skin-shedding process progressed in stages starting again at the dorsal ridge (m1, or molt stage 1) and progressing downward on the body toward the ventral surface (m2) until all dead or damaged skin was sloughed and the whale was observed with no sign of skin sloughing (m3). Four whales with signs of skin sloughing were classified as “thin” ( $\geq$  class II). Individuals with signs of severe skin sloughing were observed most frequently in August.

In 2004 we were able to identify 2 whales with such skin damage (m1) (Appendix A7). One of them proved to be foraging cow RGW052, which had similar damage in 2003, but in a more advanced stage (m2). Of the 9 whales with skin sloughing sighted in 2003, we were able to re-identify 7 during the 2004 season. Of these 7 individuals, 6 whales showed no deviations from normal skin condition (demonstrated no skin sloughing), and one whale (RGW052) had the skin damage described directly above (Appendix A7).

## **DISCUSSION**

Preliminary Photo-ID results for 2002 – 2005 for gray whales in feeding areas on the northeast shelf of Sakhalin Island identified 138 distinct individual whales. The final consolidation of the results of four years' work into a single current master catalogue and the development of a protocol for a minimum population count, i.e., a count of only the right or left sides of individuals (Darling, 1984; Weller et al., 2001; Weller et al., 2004) have made it possible to achieve higher reliability of least count totals for the current 2002-2005 Master Catalogue. To continue to increase the accuracy of the total population estimate, a comprehensive statistical model incorporating capture-recapture methodologies, and a systematic sampling scheme is being incorporated into future work.

As sightings of previously identified whales continues to increase the total count of individuals with each new study season, this improves confidence levels and facilitates the photographic matching process. Newly obtained data on known individuals are valuable to continue monitoring any changes in physical characteristics or markings that may have occurred since the last recorded sighting. Keeping sighting data current also maintains up-to-date site-fidelity records on known whales and whale groups which are important baseline information to compare if future geographical or temporal shifts occur in the whales feeding areas or feeding patterns. The geographical shift of utilization of the Offshore feeding area in 2002 to 2005 to the Piltun feeding area in 2004 to 2005 demonstrates that continuous monitoring of the whales and their movements is needed to track these spatial patterns.

The results of analysis of the data for 2002 – 2005 indicate inter- and intra-year movement of the gray whales, both within the Piltun and Offshore areas and between these areas, and, as discovered in 2005, movements into areas further north. As discussed earlier, information about the whales' movement between areas over the course of a single season can only be provided by repeat sightings of individuals recognized during the same season. A single gray whale sighting in one area during a season with subsequent re-sightings of the same animal in the other areas in successive years has also been recorded (see Table 10).

The results of the 2004 and 2005 Photo-ID study show that the significant decrease in the number of whales in the Offshore area in 2004 -2005 compared with 2001 – 2003 is coupled with the increase in the number of whales in the Piltun area. This is supported by distribution surveys of both areas in 2004 – 2005 (Vladimirov, 2005, 2006). Observations of foraging gray whales south of Piltun Bay, near Lunsky Bay in 2003 (unpublished SEIC data), and identification of individual gray whales in other areas of the Sea of Okhotsk, such as north to Okha and Cape Elizabeth during the 2005 season, indicate that the seasonal foraging habitat range of the gray whales requires additional research.

Seasonal changes in the whale distribution have been described in numerous studies and are considered a reaction to seasonal variations in habitat and movement of whale prey (Payne et al., 1986; Calambokidis et al., 1989; Calambokidis et al., 1990; Calambokidis et al., 1995; Weinrich et al., 1997; Wilson et al., 1997; Forney and Barlow, 1998; Karczmarski et al., 1999). Eastern gray whales feeding along the west coast of Vancouver Island, Canada, rotate feeding areas and prey types within and between summer feeding seasons as a function of the distribution and abundance of their prey (Bass, 2000; Dunham and Duffus, 2001, 2002; Meier, 2003).

The distribution of feeding eastern gray whales along the west coast of North America is variable within and between years with whales utilizing areas from northern California to southeast Alaska from spring to fall involving significant interchange of individuals between areas with variable use of habitat within and between years (Calambokidis et al., 2002).

Recent research has indicated that eastern gray whales are not exclusively benthic foragers but are rather dynamic and selective foragers capable of utilizing a variety of prey types and foraging tactics, switching between prey species and techniques rapidly in order to take advantage of short-term availability of food resources (Dunham and Duffus, 2001, 2002; Moore et al., 2003). Eastern gray whales are multi-scale animals that can show site-fidelity at a regional scale but also range over a larger area to use smaller sites or “nodes” within the region as a function of the distribution and abundance of prey over time.

In addition to their responding to the distribution and abundance of prey, there is some evidence that eastern gray whales, like other apex predators, can significantly influence the distribution and abundance of their prey through foraging (Bowen, 1997). These “top-down” effects can alter a prey community to the extent that whales will abandon it for months or years while it recovers to a richness that can be utilized again, thereby influencing the seasonal distribution of the whales. Although western gray whales are genetically isolated from eastern gray whales (LeDuc et al., 2002), it is likely that the manner in which eastern and western gray whales make foraging decisions in response to the distribution and abundance of prey, even in different ecological contexts, is similar.

There is no question that it is more difficult to conduct Photo-ID work in the Offshore area. One possible reason is the greater water depths in the area, which translates to longer diving times for the whales, and more unpredictability in their surface locations than in the Piltun area. This unpredictability often results in whales surfacing farther from the zodiac than in the Piltun area, making them less accessible for photographing. The Offshore area is not sheltered by proximity to the shore or shallows, as is the nearshore Piltun area, and is therefore subject to more pronounced wind and wave effects – conditions unfavorable for Photo-ID. Due to the larger size of the Offshore area, it is also more difficult to locate aggregations of whales or solitary individuals in the area from the zodiac or base ship deck. The large size of this area means that the observers may be unaware that the whales have moved into previously surveyed section or vacated the area completely, making survey effort less efficient for whale capture rate than the smaller inshore region.

Our observations support Weller’s hypothesis (Weller et al., 2000) that calves make the transition to swimming independently during the period between July and September. According to Bogoslovskaya’s data (1996) on the gray whales in waters of the Chukotka Peninsula shelf, age differentiation of the groups begins in July and August, when the calves leave their mothers and gather into groups in the shallowest waters rich in food. Shore-based vehicle surveys conducted in 2005 (Vladimirov, 2006) indicate that the separation of mother from calf was completed by early September, with the last mother-calf pair observed from shore on 11 September.

The presence of anomalously emaciated whales remains unexplained. The causes of emaciation in both Pacific gray whale populations are not clear, but a rather extensive body of evidence suggests that over-exploitation of the available food supply and/or a possible large scale climatic/oceanographic regime shift affecting

productivity in the North Pacific region have been at least partially responsible for emaciation observed in eastern gray whales. As the population of eastern gray whales increases to levels estimated to exceed the levels prior to the period of American commercial whaling, intraspecific competition pressures in the subarctic feeding grounds may be increasing (LeBoeuf et al., 2000; Moore et al., 2001, 2003).

However, recent gray whale prey studies have identified the Piltun area and, in particular, the Offshore feeding area as very rich prey sources (Fadeev, 2002, 2003, 2004, 2005, 2006), and it is unlikely that food resources are limited, although this issue requires further study. Interestingly, some whales that showed signs of emaciation in previous years failed to exhibit such signs in subsequent years.

This seasonal ability of 'thin' whales to recover to standard body condition was also previously observed between the 2002 and 2003 seasons (Yakovlev and Tyurneva, 2003, 2004; Weller et al., 2004). The energetics of gray whale foraging when combined with bi-annual feast and forage life-cycle of migrating, feeding, and breeding, are a dynamic process. Although recovery and decline in body condition for both lactating and non-lactating whales does not seem to be able to be described using simple formula, in 2005, due to the extended length of the photo ID season, we were able to clearly document an increasing improvement in the body condition of skinny whales as the feeding season progressed (Figure 2). This temporal scale of this process changes with each individual and demographic group, and continued long-term monitoring is needed to form a solid basis for understanding.

In addition to the unexplained appearance of thin individuals, skin sloughing was observed among some of the animals in 2003. When these individuals were re-encountered in 2004-2005, from review of the photographs, it appeared that the skin sloughing recorded in 2003 has had no lasting visible effect on the external physical condition of the whales' skin. In addition, the incidence of skin sloughing had decreased in 2005 compared to 2003-2004. This skin sloughing phenomenon remains unexplained, but may be a result of several factors including bacterial, viral or fungal diseases (Gaydos et al., 2004), internal or external parasites, pollution, or excessive exposure to fresh water (Thompson, 1999). Such shedding of skin has been observed among blue (Sears et al., 2000) and Greenland whales (Pettis et al., 2004), although it had not been observed previously among eastern or western gray whales.

The examples of skin sloughing that we documented showed that the skin recovers quickly after sloughing, and no subsequent pathological consequences were observed on the surface of the whales' skin (Tyurneva and Yakovlev, 2005).

This phenomenon continues to require further study to understand the duration and significance of skin sloughing events and before conclusions can be drawn to the triggers or causes of the sloughing process. It is especially important to document any future whale skin sloughing in 2006 for whales recorded with skin sloughing in 2004-2005 to continue to observe the affected group of animals for long-term patterns or change.

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## FIGURES

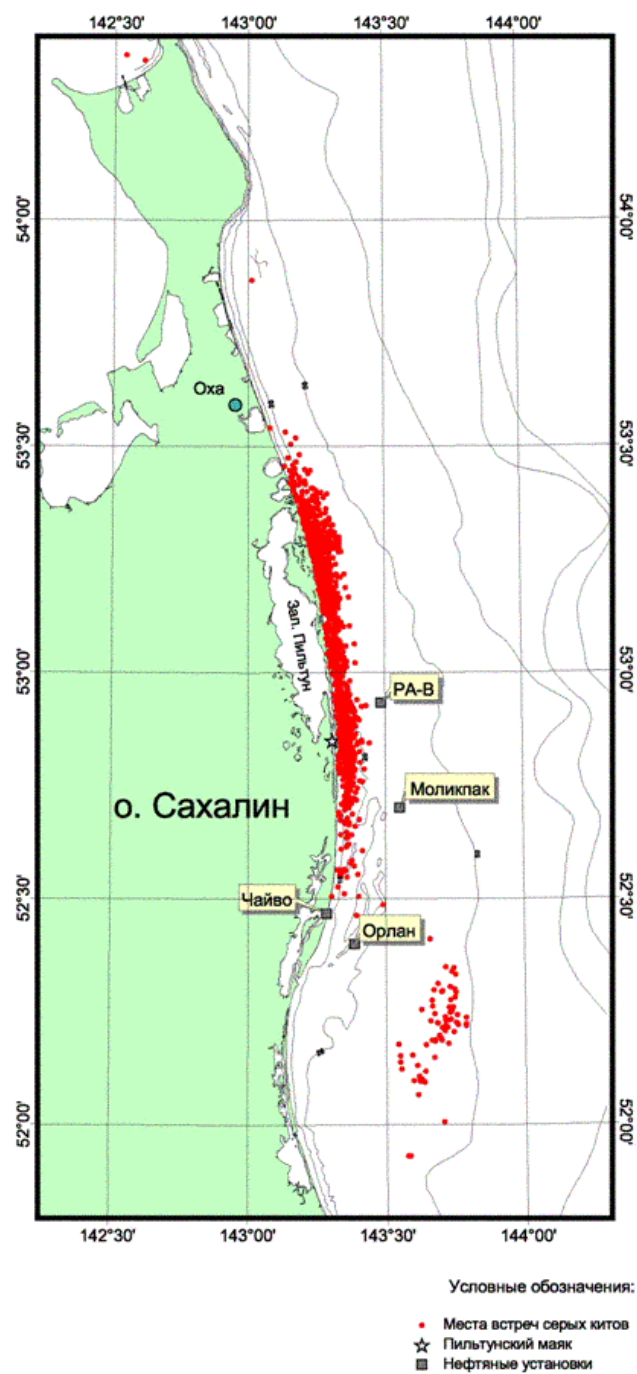


Figure A1. Sightings of photo-identified gray whales along the northeast coast of Sakhalin Island, 2005.

## APPENDICES

Table A 1. Time spent at each photo-sighting during the expedition on the RV *Oparin*, 2005.

| Item                                      | Date      | Number of missions | Duration of each sighting in minutes |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
|---|-----------|--------------------|--------------------------------------|----|----|----|----|-----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
|   |           |                    | N1                                   | N2 | N3 | N4 | N5 | N6  | N7 | N8 | N9 | N10 | N11 | N12 | N13 | N14 | N15 | N16 | N17 | N18 | N19 | N20 | N21 | N22 | N23 | Total |
| 1   | 7/14/2005 | 1                  | 5                                    | 5  | 25 | 2  | 0  | 17  | 29 | 26 | 2  | 9   | 2   |     |     |     |     |     |     |     |     |     |     |     |     | 122   |
| 2   | 7/17/2005 | 1                  | 21                                   | 31 | 6  | 23 | 13 | 7   | 2  | 2  | 6  | 30  | 19  |     |     |     |     |     |     |     |     |     |     |     |     | 160   |
| 3   | 7/22/2005 | 1                  | NF                                   |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | ND    |
| 4   | 7/23/2005 | 2                  | 23                                   | 45 |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 68    |
| 5   | 7/24/2005 | 3                  | 15                                   | 60 | 40 |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 115   |
| 6   | 7/26/2005 | 2                  | 9                                    | 6  | 2  | 3  | 12 | 17  | 7  | 6  | 38 | 12  | 37  | 54  | 10  | 46  | 33  | 17  |     |     |     |     |     |     |     | 309   |
| 7   | 7/27/2005 | 2                  | 27                                   | 26 | 5  | 8  | 16 | 177 | 36 | 23 | 5  |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 323   |
| 8   | 7/29/2005 | 2                  | 15                                   | 5  | 9  | 7  | 6  | 8   | 7  | 7  | 19 | 29  | 5   | 38  |     |     |     |     |     |     |     |     |     |     |     | 155   |
| 9   | 8/7/2005  | 2                  | 44                                   | 33 | 13 | 46 | 13 |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 149   |
| 10  | 8/8/2005  | 2                  | 58                                   | 45 | 13 | 29 | 3  |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 148   |
| 11  | 8/9/2005  | 2                  | 34                                   | 34 | 20 |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 88    |
| 12  | 8/11/2005 | 1                  | 14                                   | 22 |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 36    |
| 13  | 8/16/2005 | 1                  | 22                                   | 31 |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 53    |
| 14  | 8/18/2005 | 1                  | 20                                   |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 20    |
| 15  | 8/20/2005 | 3                  | 13                                   | 13 | 22 | 5  | 19 | 4   | 10 | 13 | 4  | 15  | 15  | 12  | 17  | 18  | 4   |     |     |     |     |     |     |     |     | 184   |
| 16  | 8/21/2005 | 1                  | 11                                   | 7  | 25 | 16 | 21 | 8   | 3  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 91    |
| 17  | 8/23/2005 | 2                  | 9                                    | 4  | 4  | 10 | 18 | 5   | 23 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 73    |
| 18  | 8/24/2005 | 2                  | 22                                   | 12 | 14 | 14 | 8  | 20  | 53 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 143   |
| 19  | 8/25/2005 | 4                  | 15                                   | 19 | 23 | 6  | 6  | 23  | 43 | 12 | 9  | 15  | 2   | 20  | 7   |     |     |     |     |     |     |     |     |     |     | 200   |
| 20  | 8/31/2005 | 1                  | 20                                   |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 20    |
| 21  | 9/1/2005  | 3                  | 30                                   | 33 | 25 | 12 | 4  | 5   |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 109   |
| 22  | 9/6/2005  | 1                  | 7                                    |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 7     |
| 23  | 9/7/2005  | 1                  | 34                                   |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 34    |
| 24  | 9/8/2005  | 2                  | 22                                   | 65 |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 87    |
| 25  | 9/9/2005  | 1                  | 50                                   |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 50    |
| 26  | 9/16/2005 | 1                  | 7                                    | 12 |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 19    |
| 27  | 9/20/2005 | 1                  | 20                                   |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 20    |
| 28  | 9/22/2005 | 2                  | 55                                   | 40 | 18 | 18 | 25 | 21  | 4  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 181   |
| 29  | 9/23/2005 | 1                  | 100                                  |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 100   |
| 30  | 9/24/2005 | 2                  | 10                                   | 26 | 38 | 41 |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 115   |
| 31  | 9/25/2005 | 3                  | 9                                    | 2  | 9  | 7  | 6  | 17  | 12 | 11 | 20 | 66  | 31  | 52  | 11  | 9   | 20  | 17  | 2   | 6   | 12  | 4   | 15  | 9   | 6   | 353   |
| 32  | 10/1/2005 | 2                  | 45                                   | 34 | 10 | 7  | 19 | 28  |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 143   |
| Total:                                    |           | 56                 |                                      |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 3675  |
| Days for Offshore area are shown in gray. |           |                    |                                      |    |    |    |    |     |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |

Table A 2. Gray whale group sizes at each photolD sighting from the zodiac and the ship deck of the RV *Oparin* in the Piltun and Offshore feeding areas, 2005.

| Item                             | Date      | Group size of each sighting (from Zodiac) |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | Total whales sighted from Zodiac |
|----------------------------------|-----------|---|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------------------------------|
|                                  |           | N1  | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | N11 | N12 | N13 | N14 | N15 | N16 | N17 | N18 | N19 | N20 | N21 | N22 | N23 |                                  |
| 1                                | 7/14/2005 | 1   | 2  | 5  | 1  | 1  | 2  | 2  | 4  | 2  | 3   | 1   |     |     |     |     |     |     |     |     |     |     |     |     | 24                               |
| 2                                | 7/17/2005 | 2   | 7  | 2  | 3  | 3  | 1  | 2  | 3  | 4  | 3   | 5   |     |     |     |     |     |     |     |     |     |     |     |     | 35                               |
| 3                                | 7/22/2005 | 0   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 0                                |
| 4                                | 7/23/2005 | 1   | 2  |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 3                                |
| 5                                | 7/24/2005 | 1   | 2  | 2  |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 5                                |
| 6                                | 7/26/2005 | 1   | 1  | 2  | 2  | 4  | 2  | 3  | 2  | 3  | 3   | 4   | 3   | 3   | 4   | 3   | 1   |     |     |     |     |     |     |     | 41                               |
| 7                                | 7/27/2005 | 5   | 3  | 2  | 1  | 3  | 1  | 4  | 1  | 2  |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 22                               |
| 8                                | 7/29/2005 | 2   | 1  | 3  | 1  | 1  | 2  | 2  | 1  | 4  | 2   | 4   |     |     |     |     |     |     |     |     |     |     |     |     | 23                               |
| 9                                | 8/7/2005  | 3   | 2  | 5  | 4  | 1  |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 15                               |
| 10                               | 8/8/2005  | 2   | 2  | 5  | 3  | 1  |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 13                               |
| 11                               | 8/9/2005  | 2   | 1  | 1  |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 4                                |
| 12                               | 8/11/2005 | 2   | 3  |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 5                                |
| 13                               | 8/16/2005 | 2   | 2  |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 4                                |
| 14                               | 8/18/2005 | 4   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 4                                |
| 15                               | 8/20/2005 | 6   | 2  | 3  | 3  | 2  | 1  | 3  | 2  | 4  | 4   | 2   | 3   | 1   | 4   | 4   |     |     |     |     |     |     |     |     | 44                               |
| 16                               | 8/21/2005 | 1   | 1  | 3  | 2  | 4  | 3  | 3  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 17                               |
| 17                               | 8/23/2005 | 1   | 4  | 2  | 6  | 3  | 1  | 2  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 19                               |
| 18                               | 8/24/2005 | 2   | 1  | 2  | 3  | 1  | 3  | 3  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 15                               |
| 19                               | 8/25/2005 | 2   | 1  | 4  | 2  | 1  | 3  | 5  | 1  | 2  | 3   | 1   | 3   | 4   |     |     |     |     |     |     |     |     |     |     | 32                               |
| 20                               | 8/31/2005 | 2   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 2                                |
| 21                               | 9/1/2005  | 2   | 5  | 4  | 2  | 2  | 2  |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 17                               |
| 22                               | 9/6/2005  | 1   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1                                |
| 23                               | 9/7/2005  | 2   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 2                                |
| 24                               | 9/8/2005  | 4   | 2  |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 6                                |
| 25                               | 9/9/2005  | 1   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1                                |
| 26                               | 9/16/2005 | 1   | 1  |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 2                                |
| 27                               | 9/20/2005 | 1   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1                                |
| 28                               | 9/22/2005 | 2   | 3  | 4  | 2  | 2  | 4  | 1  |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 18                               |
| 29                               | 9/23/2005 | 2   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 2                                |
| 30                               | 9/24/2005 | 1   | 1  | 5  | 5  |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 12                               |
| 31                               | 9/25/2005 | 3   | 1  | 2  | 1  | 1  | 2  | 1  | 1  | 1  | 8   | 4   | 4   | 2   | 1   | 2   | 3   | 1   | 1   | 3   | 1   | 3   | 5   | 2   | 53                               |
| 32                               | 10/1/2005 | 2   | 3  | 1  | 2  | 1  | 2  |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 11                               |
| Total:                           |           |   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 453                              |
| Offshore area highlighted (gray) |           |   |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |                                  |

Table A3. Target aspects photographed for individual gray whales off the northeastern coast of Sakhalin Island, 2002 - 2005.

|        | 2002 |    |    |    |   | 2003 |    |    |    |   | 2004 |    |    |    |   | 2005 |    |    |    |   | Number<br>of<br>Aspects |
|--------|------|----|----|----|---|------|----|----|----|---|------|----|----|----|---|------|----|----|----|---|-------------------------|
| N      | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | 02-05                   |
| RGW001 | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW002 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW003 | Y    | Y  | Y  | Y  | Y |      |    |    |    |   |      |    |    |    |   |      |    |    |    |   | 4                       |
| RGW004 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y |      |    |    |    |   |      |    |    |    |   | 4                       |
| RGW005 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |
| RGW006 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW007 | Y    | Y  | Y  | Y  | Y |      |    | Y  | Y  | Y |      | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW008 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW009 | Y    | Y  | Y  | Y  | Y |      |    |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW010 | DEL  |    |    |    |   | DEL  |    |    |    |   | DEL  |    |    |    |   |      |    |    |    |   |                         |
| RGW011 | Y    | Y  |    |    | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW012 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW013 | Y    | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y |      | Y  | Y  | Y  | Y | 4                       |
| RGW014 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW015 | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW016 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW017 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  |    | Y | 4                       |
| RGW018 |      | Y  |    |    | N |      |    |    |    |   |      |    |    |    |   | Y    | Y  |    |    | Y | 4                       |
| RGW019 | Y    | Y  | Y  | Y  | Y |      | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW020 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW021 | Y    |    |    |    | N | Y    | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |
| RGW022 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW023 | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW024 | Y    | Y  |    |    | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | 4                       |
| RGW025 | Y    |    |    |    | N |      |    |    |    |   |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW026 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    |    |    |    | Y | Y    | Y  | Y  |    | Y | 4                       |
| RGW027 | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y |      |    |    |    |   | Y    | Y  |    |    | Y | 2                       |
| RGW028 |      | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |

|        | 2002 |    |    |    |   | 2003 |    |    |    |   | 2004 |    |    |    |   | 2005         |    |    |    |   | Number<br>of<br>Aspects |
|--------|------|----|----|----|---|------|----|----|----|---|------|----|----|----|---|--------------|----|----|----|---|-------------------------|
| N      | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | RS           | LS | DF | VF |   | 02-05                   |
| RGW029 | Y    | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW030 | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | Y            | Y  |    |    |   | 2                       |
| RGW031 | Y    |    |    |    | N |      |    |    |    |   |      |    |    |    |   |              |    |    |    |   | 1                       |
| RGW032 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW033 | Y    |    |    |    | N |      | Y  | Y  | Y  | Y | Y    |    | Y  |    | Y |              |    |    |    |   | 4                       |
| RGW034 | Y    | Y  |    | Y  | Y | Y    | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW035 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    | Y  | Y | Y            | Y  |    |    | Y | 4                       |
| RGW036 | Y    | Y  |    |    | Y |      |    |    |    |   |      | Y  |    |    | Y | Y            | Y  |    |    | Y | 2                       |
| RGW037 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW038 | Y    |    |    |    | N | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  |    | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW039 | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW040 | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y |              |    |    |    |   | 4                       |
| RGW041 | Y    |    |    |    | N | Y    | Y  |    | Y  | Y |      |    |    |    |   | Y            | Y  |    |    | Y | 3                       |
| RGW042 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | Y            | Y  |    |    | Y | 4                       |
| RGW043 | Y    | Y  |    |    | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW044 | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW045 |      | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW046 | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | Y            | Y  | Y  |    | Y | 4                       |
| RGW047 | Y    | Y  | Y  |    | Y |      | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW048 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  |    | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW049 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y |      |    |    |    |   |              |    |    |    |   | 4                       |
| RGW050 |      |    |    |    |   | Y    | Y  |    |    | Y | Y    | Y  |    | Y  | Y | Y            | Y  |    |    | Y | 3                       |
| RGW051 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  |    | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW052 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  |    |    | Y | 4                       |
| RGW053 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW054 |      |    |    |    |   | Y    | Y  |    |    | Y |      |    |    |    |   |              |    |    |    |   | 2                       |
| RGW055 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  |    | Y | DEL = RGW018 |    |    |    |   |                         |
| RGW056 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW057 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y |      |    | Y  | Y  | N | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW058 |      |    |    |    |   | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | Y            | Y  | Y  | Y  | Y | 4                       |



|        | 2002 |    |    |    |  | 2003 |    |    |    |     | 2004 |    |    |    |   | 2005 |    |    |    |   | Number<br>of<br>Aspects |
|--------|------|----|----|----|--|------|----|----|----|-----|------|----|----|----|---|------|----|----|----|---|-------------------------|
| N      | RS   | LS | DF | VF |  | RS   | LS | DF | VF |     | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | 02-05                   |
| RGW059 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |
| RGW060 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   |      |    |    |    |   |      |    |    |    |   | 4                       |
| RGW061 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW062 |      |    |    |    |  | Y    | Y  |    |    | Y   |      |    |    |    |   | Y    | Y  | Y  | Y  |   | 4                       |
| RGW063 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | 4                       |
| RGW064 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW065 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |
| RGW066 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW067 |      |    |    |    |  | Y    | Y  | Y  |    | Y   | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW068 |      |    |    |    |  | Y    | Y  |    |    | Y   |      |    |    |    |   |      |    |    |    |   | 2                       |
| RGW069 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    |    | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW070 |      |    |    |    |  | Y    | Y  |    |    | Y   |      | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |
| RGW071 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  |    | Y | 4                       |
| RGW072 |      |    |    |    |  | DEL  |    |    |    | DEL |      |    |    |    |   |      |    |    |    |   |                         |
| RGW073 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | 2                       |
| RGW074 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    | Y | 4                       |
| RGW075 |      |    |    |    |  | Y    |    | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW076 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | 2                       |
| RGW077 |      |    |    |    |  | Y    | Y  |    |    | Y   |      |    |    |    |   |      |    |    |    |   | 2                       |
| RGW078 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   |      |    | Y  |    | N |      |    | Y  |    | Y | 4                       |
| RGW079 |      |    |    |    |  | Y    | Y  |    |    | Y   |      |    |    |    |   |      |    |    |    |   | 2                       |
| RGW080 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | 2                       |
| RGW081 |      |    |    |    |  | Y    | Y  |    |    | Y   |      |    |    |    |   |      |    |    |    |   | 2                       |
| RGW082 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  | Y  |    | Y | Y    | Y  | Y  |    | Y | 3                       |
| RGW083 |      |    |    |    |  | Y    | Y  |    |    | Y   |      |    |    |    |   | Y    | Y  | Y  |    | Y | 3                       |
| RGW084 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | 4                       |
| RGW085 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  |    | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW086 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  |    |    | Y | Y    | Y  |    |    | Y | 2                       |
| RGW087 |      |    |    |    |  | Y    | Y  |    |    | Y   | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  | Y | 4                       |
| RGW088 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y   | Y    | Y  | Y  | Y  | Y |      |    |    |    |   | 4                       |

|        | 2002 |    |    |    |  | 2003 |    |    |    |   | 2004 |    |    |    |   | 2005         |    |    |    |   | Number<br>of<br>Aspects |
|--------|------|----|----|----|--|------|----|----|----|---|------|----|----|----|---|--------------|----|----|----|---|-------------------------|
| N      | RS   | LS | DF | VF |  | RS   | LS | DF | VF |   | RS   | LS | DF | VF |   | RS           | LS | DF | VF |   | 02-05                   |
| RGW089 |      |    |    |    |  | Y    |    |    |    | N | Y    | Y  | Y  | Y  | Y | Y            | Y  |    |    | Y | 4                       |
| RGW090 |      |    |    |    |  | Y    | Y  |    |    | Y | Y    | Y  | Y  |    | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW091 |      |    |    |    |  |      | Y  |    |    | N | Y    | Y  | Y  | Y  | Y | Y            | Y  |    |    | Y | 4                       |
| RGW092 |      |    |    |    |  | Y    | Y  | Y  | Y  | Y |      |    |    |    |   |              |    |    |    |   | 4                       |
| RGW093 |      |    |    |    |  | Y    |    |    |    | N |      |    |    |    |   | DEL IS RGW56 |    |    |    |   |                         |
| RGW094 |      |    |    |    |  |      | Y  |    |    | N |      |    |    |    |   |              |    |    |    |   | 1                       |
| RGW095 |      |    |    |    |  |      | Y  |    |    | N |      |    |    |    |   | Y            | Y  |    |    | Y | 2                       |
| RGW096 |      |    |    |    |  |      | Y  |    |    | N |      |    |    |    |   |              | Y  | Y  | Y  | N | 3                       |
| RGW097 |      |    |    |    |  | Y    |    |    |    | N |      |    |    |    |   |              |    |    |    |   | 1                       |
| RGW098 |      |    |    |    |  |      | Y  |    |    | N | Y    | Y  |    |    | Y |              | Y  | Y  |    | Y | 2                       |
| RGW099 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y | Y            | Y  | Y  |    | Y | 3                       |
| RGW100 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  |    | Y | 4                       |
| RGW101 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y |              |    |    |    |   | 4                       |
| RGW102 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y | Y            | Y  |    |    | Y | 2                       |
| RGW103 |      |    |    |    |  |      |    |    |    |   | Y    |    | Y  | Y  | Y |              |    |    |    |   | 3                       |
| RGW104 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y |              |    |    |    |   | 2                       |
| RGW105 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y | Y            | Y  | Y  |    | Y | 2                       |
| RGW106 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y |              |    |    |    |   | 2                       |
| RGW107 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y |              |    |    |    |   | 2                       |
| RGW108 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y | Y            | Y  |    |    | Y | 2                       |
| RGW109 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  |    | Y | 4                       |
| RGW110 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  |    |    | Y | 4                       |
| RGW111 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW112 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y | Y            | Y  |    |    | Y | 2                       |
| RGW113 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y | Y            | Y  |    |    | Y | 2                       |
| RGW114 |      |    |    |    |  |      |    |    |    |   | Y    |    |    |    | N | Y            | Y  |    |    | Y | 2                       |
| RGW115 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW116 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y |              |    |    |    |   | 2                       |
| RGW117 |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  | Y | Y            | Y  | Y  | Y  | Y | 4                       |
| RGW118 |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    | Y |              |    |    |    |   | 2                       |

|        | 2002 |    |    |    |  | 2003 |    |    |    |  | 2004 |    |    |    |   | 2005 |    |    |    |  | Number<br>of<br>Aspects |       |
|--------|------|----|----|----|--|------|----|----|----|--|------|----|----|----|---|------|----|----|----|--|-------------------------|-------|
| N      | RS   | LS | DF | VF |  | RS   | LS | DF | VF |  | RS   | LS | DF | VF |   | RS   | LS | DF | VF |  |                         | 02-05 |
| RGW119 |      |    |    |    |  |      |    |    |    |  | Y    | Y  | Y  | Y  | Y | Y    | Y  |    |    |  | Y                       | 4     |
| RGW120 |      |    |    |    |  |      |    |    |    |  | Y    | Y  |    |    | Y | Y    |    |    |    |  | Y                       | 2     |
| RGW121 |      |    |    |    |  |      |    |    |    |  | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW122 |      |    |    |    |  |      |    |    |    |  | Y    | Y  |    |    | Y | Y    | Y  |    |    |  | Y                       | 2     |
| RGW123 |      |    |    |    |  |      |    |    |    |  | Y    | Y  |    |    | Y | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW124 |      |    |    |    |  |      |    |    |    |  |      | Y  |    | Y  | N | Y    | Y  |    |    |  | Y                       | 2     |
| RGW125 |      |    |    |    |  |      |    |    |    |  |      | Y  |    | Y  | N | Y    | Y  | Y  |    |  | Y                       | 2     |
| RGW126 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW127 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW128 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW129 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW130 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW131 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW132 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  | Y  | Y  |  | Y                       | 4     |
| RGW133 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW134 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW135 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW136 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW137 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW138 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW139 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW140 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW141 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW142 |      |    |    |    |  |      |    |    |    |  |      |    |    |    |   | Y    | Y  |    |    |  | Y                       | 2     |
| RGW0Q1 |      |    |    |    |  |      |    |    |    |  |      | Y  |    |    | N |      |    |    |    |  |                         | 1     |
| RGW0Q2 |      |    |    |    |  |      |    |    |    |  |      | Y  |    |    | N |      | Y  |    |    |  | N                       | 1     |

Table A4. Sightings of Photo-IDentified gray whales in both the Piltun and Offshore areas during the 2002-2005 field expeditions along the northeast Sakhalin Island shelf.

| Whale number | 2002   |          | 2003   |          | 2004   |          | 2005   |          |       |                |
|--------------|--------|----------|--------|----------|--------|----------|--------|----------|-------|----------------|
|              | Area   |          | Area   |          | Area   |          | Area   |          |       |                |
|              | Piltun | Offshore | Piltun | Offshore | Piltun | Offshore | Piltun | Offshore | North | Cape Elizabeth |
| RGW001       |        | 1        |        |          | 2      | 1        | 2      |          |       |                |
| RGW002       |        | 3        |        | 4        | 2      |          | 5      |          |       |                |
| RGW003       |        | 2        |        |          |        |          |        |          |       |                |
| RGW004       |        | 1        |        | 2        |        |          |        |          |       |                |
| RGW005       |        | 1        | 2      |          | 5      |          | 2      |          |       |                |
| RGW006       |        | 2        | 2      |          | 2      |          |        |          | 1     |                |
| RGW007       |        | 1        |        | 1        | 1      |          | 3      |          |       |                |
| RGW008       |        | 2        |        | 1        | 3      |          | 1      |          | 1     |                |
| RGW009       |        | 2        |        |          | 2      |          | 4      |          |       |                |
| RGW010       |        | 1        |        |          |        |          |        |          |       |                |
| RGW011       |        | 1        |        |          | 3      |          | 3      |          |       |                |
| RGW012       |        | 2        |        | 3        | 3      |          | 7      |          |       |                |
| RGW013       |        | 1        |        | 3        | 3      |          | 1      |          |       |                |
| RGW014       |        | 1        |        | 2        | 2      |          | 2      |          |       |                |
| RGW015       |        | 2        |        |          | 1      |          | 2      |          |       |                |
| RGW016       |        | 3        |        | 1        |        |          | 4      |          |       |                |
| RGW017       |        | 2        | 1      |          | 3      |          | 2      |          |       |                |
| RGW018       |        | 1        |        |          |        |          | 3      |          |       |                |
| RGW019       | 1      |          | 1      |          | 1      |          | 6      |          |       |                |
| RGW020       |        | 3        |        | 4        | 4      | 2        | 1      |          |       |                |
| RGW021       |        | 1        |        | 2        | 2      |          | 6      |          |       |                |
| RGW022       |        | 2        |        | 4        | 5      |          | 3      |          |       |                |
| RGW023       | 1      |          |        |          | 3      |          | 2      |          |       |                |
| RGW024       | 2      |          |        |          | 2      |          | 2      |          |       |                |
| RGW025       | 1      |          |        |          |        |          | 4      |          |       |                |
| RGW026       | 2      | 1        |        | 2        | 1      |          | 1      |          |       |                |
| RGW027       | 2      |          | 2      |          |        |          | 4      |          |       |                |
| RGW028       | 1      |          | 2      |          | 1      |          | 4      |          |       |                |
| RGW029       |        | 1        | 3      |          | 2      |          | 4      |          |       |                |
| RGW030       | 1      |          | 1      |          | 2      |          | 4      |          |       |                |
| RGW031       | 1      |          |        |          |        |          |        |          |       |                |
| RGW032       | 2      |          | 2      |          | 3      |          | 5      |          |       |                |
| RGW033       | 1      |          |        |          | 1      |          |        |          |       |                |
| RGW034       |        | 2        | 1      |          | 2      |          | 4      |          |       |                |
| RGW035       |        | 1        |        | 2        | 2      |          | 2      |          |       |                |
| RGW036       |        | 2        |        |          | 1      |          | 4      |          |       |                |
| RGW037       |        | 1        | 2      | 2        | 3      |          | 2      |          |       |                |
| RGW038       |        | 1        |        | 3        | 1      |          | 5      |          |       |                |
| RGW039       |        | 2        | 1      |          | 3      |          | 3      |          |       |                |
| RGW040       |        | 1        | 2      | 1        | 6      |          |        |          |       |                |
| RGW041       |        | 1        | 2      |          |        |          | 2      |          |       |                |
| RGW042       |        | 1        | 1      |          | 1      |          | 2      |          |       |                |
| RGW043       |        | 1        |        |          | 2      |          | 3      |          |       |                |
| RGW044       | 1      |          |        |          | 2      |          | 4      |          |       |                |

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RGW009

|        |   |   |   |   |   |   |   |   |  |  |
|--------|---|---|---|---|---|---|---|---|--|--|
| RGW045 | 1 | 2 | 2 | 3 |   | 4 |   |   |  |  |
| RGW046 | 1 | 2 |   | 4 |   | 6 |   |   |  |  |
| RGW047 | 1 |   | 1 |   | 1 | 1 |   |   |  |  |
| RGW048 |   |   | 2 | 1 |   | 4 | 1 |   |  |  |
| RGW049 |   | 2 |   |   |   | 2 |   |   |  |  |
| RGW050 |   | 1 |   | 2 |   | 3 |   |   |  |  |
| RGW051 |   | 1 |   | 1 |   | 2 |   | 1 |  |  |
| RGW052 |   | 3 |   | 6 |   | 1 |   |   |  |  |
| RGW053 |   |   | 3 | 3 | 1 | 2 |   |   |  |  |
| RGW054 |   | 2 |   |   |   |   |   |   |  |  |
| RGW055 |   |   | 2 | 3 |   |   |   |   |  |  |
| RGW056 |   | 1 |   |   |   | 3 |   |   |  |  |
| RGW057 |   |   | 1 | 1 |   | 2 |   |   |  |  |
| RGW058 |   | 1 |   |   |   | 1 |   |   |  |  |
| RGW059 |   | 3 |   | 2 |   | 3 |   |   |  |  |
| RGW060 |   |   | 1 |   |   |   |   |   |  |  |
| RGW061 |   |   | 2 | 2 |   | 3 |   |   |  |  |
| RGW062 |   | 2 | 1 |   |   | 4 |   |   |  |  |
| RGW063 |   | 2 |   | 2 |   | 3 |   |   |  |  |
| RGW064 |   | 1 |   | 3 |   | 4 |   |   |  |  |
| RGW065 |   | 1 |   | 1 | 1 | 4 |   |   |  |  |
| RGW066 |   | 1 |   | 4 |   | 3 |   |   |  |  |
| RGW067 |   | 1 |   | 3 |   | 4 |   |   |  |  |
| RGW068 |   | 1 |   |   |   |   |   |   |  |  |
| RGW069 |   |   | 3 | 1 |   | 2 |   |   |  |  |
| RGW070 |   | 2 |   | 1 |   | 1 |   |   |  |  |
| RGW071 |   |   | 1 | 4 |   | 2 |   |   |  |  |
| RGW072 |   |   | 1 |   |   |   |   |   |  |  |
| RGW073 |   | 2 |   | 2 |   | 2 |   |   |  |  |
| RGW074 |   |   | 3 | 2 |   | 3 |   |   |  |  |
| RGW075 |   | 1 |   | 4 |   | 2 |   |   |  |  |
| RGW076 |   | 4 |   | 1 |   | 3 |   |   |  |  |
| RGW077 |   | 1 |   |   |   |   |   |   |  |  |
| RGW078 |   | 3 |   | 1 |   | 1 |   |   |  |  |
| RGW079 |   | 2 |   |   |   |   |   |   |  |  |
| RGW080 |   | 1 |   | 2 |   | 1 |   |   |  |  |
| RGW081 |   | 1 |   |   |   |   |   |   |  |  |
| RGW082 |   | 3 |   | 2 |   | 5 |   |   |  |  |
| RGW083 |   | 1 |   |   |   | 3 |   |   |  |  |
| RGW084 |   | 1 |   | 4 |   |   |   |   |  |  |
| RGW085 |   | 3 |   | 2 |   | 4 |   |   |  |  |
| RGW086 |   | 3 |   | 1 |   | 2 |   |   |  |  |
| RGW087 |   | 1 |   | 1 |   | 4 |   |   |  |  |
| RGW088 |   |   | 3 | 3 |   |   |   |   |  |  |
| RGW089 |   |   | 2 | 1 |   | 5 |   |   |  |  |
| RGW090 |   |   | 2 | 3 |   | 2 |   |   |  |  |
| RGW091 |   |   | 1 | 5 |   | 2 |   |   |  |  |
| RGW092 |   |   | 1 |   |   |   |   |   |  |  |
| RGW093 |   | 1 |   |   |   |   |   |   |  |  |
| RGW094 |   | 1 |   |   |   |   |   |   |  |  |
| RGW095 |   | 1 |   |   |   | 4 |   |   |  |  |

REMOVED AS  
COMPOSITE OF  
RGW018

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COMPOSITE OF  
RGW056

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COMPOSITE OF  
RGW056

|        |  |  |   |   |   |   |  |     |   |   |   |     |
|--------|--|--|---|---|---|---|--|-----|---|---|---|-----|
| RGW096 |  |  | 1 |   |   |   |  |     |   |   |   |     |
| RGW097 |  |  |   | 1 |   |   |  |     |   |   |   |     |
| RGW098 |  |  |   | 1 |   |   |  |     |   |   |   |     |
| RGW099 |  |  |   |   | 4 |   |  | 3   |   |   |   |     |
| RGW100 |  |  |   |   | 1 |   |  | 2   |   |   |   |     |
| RGW101 |  |  |   |   | 3 |   |  | 2   |   |   |   |     |
| RGW102 |  |  |   |   | 6 |   |  |     |   |   |   |     |
| RGW103 |  |  |   |   | 4 |   |  | 1   |   |   |   |     |
| RGW104 |  |  |   |   | 2 | 1 |  |     |   |   |   |     |
| RGW105 |  |  |   |   | 1 |   |  | 5   |   |   |   |     |
| RGW106 |  |  |   |   | 2 |   |  |     |   |   |   |     |
| RGW107 |  |  |   |   | 2 |   |  |     |   |   |   |     |
| RGW108 |  |  |   |   | 3 |   |  | 5   |   |   |   |     |
| RGW109 |  |  |   |   | 2 |   |  | 2   |   |   |   |     |
| RGW110 |  |  |   |   | 1 | 1 |  | 1   |   |   |   |     |
| RGW111 |  |  |   |   | 1 |   |  | 9   |   |   |   |     |
| RGW112 |  |  |   |   | 1 |   |  | 4   |   |   |   |     |
| RGW113 |  |  |   |   | 2 |   |  | 2   |   |   |   |     |
| RGW114 |  |  |   |   | 1 |   |  | 3   |   |   |   |     |
| RGW115 |  |  |   |   | 1 |   |  | 4   |   |   |   |     |
| RGW116 |  |  |   |   | 2 |   |  |     |   |   |   |     |
| RGW117 |  |  |   |   | 4 |   |  | 2   | 1 |   |   |     |
| RGW118 |  |  |   |   | 1 |   |  |     |   |   |   |     |
| RGW119 |  |  |   |   | 1 |   |  | 1   |   |   |   |     |
| RGW120 |  |  |   |   | 1 |   |  | 1   |   |   |   |     |
| RGW121 |  |  |   |   | 2 |   |  | 2   |   |   |   |     |
| RGW122 |  |  |   |   | 2 |   |  | 3   |   |   |   |     |
| RGW123 |  |  |   |   | 1 |   |  | 3   |   |   |   |     |
| RGW124 |  |  |   |   | 1 |   |  | 1   |   |   |   |     |
| RGW125 |  |  |   |   | 1 |   |  | 4   |   |   |   |     |
| RGW126 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW127 |  |  |   |   |   |   |  | 5   |   |   |   |     |
| RGW128 |  |  |   |   |   |   |  | 3   |   |   |   |     |
| RGW129 |  |  |   |   |   |   |  |     | 1 |   |   |     |
| RGW130 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW131 |  |  |   |   |   |   |  |     |   |   | 2 |     |
| RGW132 |  |  |   |   |   |   |  | 1   |   | 1 |   |     |
| RGW133 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW134 |  |  |   |   |   |   |  | 6   |   |   |   |     |
| RGW135 |  |  |   |   |   |   |  | 4   |   |   |   |     |
| RGW136 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW137 |  |  |   |   |   |   |  | 1   |   |   |   |     |
| RGW138 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW139 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW140 |  |  |   |   |   |   |  | 2   |   |   |   |     |
| RGW141 |  |  |   |   |   |   |  | 1   |   |   |   |     |
| RGW142 |  |  |   |   |   |   |  | 1   |   |   |   |     |
| RGW0Q1 |  |  |   |   | 2 |   |  | 317 | 3 | 4 | 2 | 326 |
| RGW0Q2 |  |  |   |   | 1 |   |  |     |   |   |   |     |

Table A5. Sighting frequency of photo-identified gray whales on the northeast Sakhalin Island shelf, 2002-2005.

| Whale # | Number of whale sighting days |         |      |      |             |
|---------|-------------------------------|---------|------|------|-------------|
|         | 2002                          | 2003    | 2004 | 2005 | Total 4 yrs |
| RGW001  | 1                             | 0       | 3    | 2    | 6           |
| RGW002  | 3                             | 4       | 2    | 5    | 14          |
| RGW003  | 2                             | 0       | 0    | 0    | 2           |
| RGW004  | 1                             | 2       | 0    | 0    | 3           |
| RGW005  | 2                             | 2       | 5    | 2    | 9           |
| RGW006  | 2                             | 2       | 2    | 1    | 7           |
| RGW007  | 1                             | 1       | 1    | 1    | 4           |
| RGW008  | 1                             | 1       | 3    | 2    | 7           |
| RGW009  | 1                             | 0       | 2    | 4    | 7           |
| RGW010  | 2                             | deleted |      |      |             |
| RGW011  | 1                             | 0       | 3    | 3    | 7           |
| RGW012  | 2                             | 3       | 3    | 7    | 15          |
| RGW013  | 1                             | 3       | 3    | 1    | 8           |
| RGW014  | 1                             | 2       | 2    | 2    | 7           |
| RGW015  | 1                             | 0       | 1    | 2    | 4           |
| RGW016  | 3                             | 1       | 0    | 4    | 8           |
| RGW017  | 1                             | 1       | 3    | 2    | 7           |
| RGW018  | 3                             | 0       | 0    | 3    | 6           |
| RGW019  | 1                             | 1       | 1    | 6    | 9           |
| RGW020  | 1                             | 4       | 6    | 1    | 12          |
| RGW021  | 2                             | 2       | 2    | 6    | 12          |
| RGW022  | 1                             | 4       | 5    | 3    | 13          |
| RGW023  | 1                             | 0       | 3    | 2    | 6           |
| RGW024  | 2                             | 0       | 2    | 0    | 4           |
| RGW025  | 1                             | 0       | 0    | 2    | 3           |
| RGW026  | 2                             | 2       | 1    | 4    | 9           |
| RGW027  | 1                             | 2       | 0    | 1    | 4           |
| RGW028  | 2                             | 2       | 1    | 4    | 9           |
| RGW029  | 2                             | 3       | 2    | 4    | 11          |
| RGW030  | 2                             | 1       | 2    | 4    | 9           |
| RGW031  | 1                             | 0       | 0    | 0    | 1           |
| RGW032  | 2                             | 2       | 3    | 5    | 12          |
| RGW033  | 1                             | 0       | 1    | 0    | 2           |
| RGW034  | 1                             | 1       | 2    | 4    | 8           |
| RGW035  | 1                             | 2       | 2    | 2    | 7           |
| RGW036  | 1                             | 0       | 1    | 4    | 6           |
| RGW037  | 1                             | 4       | 3    | 2    | 10          |
| RGW038  | 1                             | 3       | 1    | 5    | 10          |
| RGW039  | 1                             | 1       | 3    | 3    | 8           |
| RGW040  | 1                             | 3       | 6    | 0    | 10          |
| RGW041  | 2                             | 2       | 0    | 2    | 6           |
| RGW042  | 2                             | 1       | 1    | 2    | 6           |
| RGW043  | 1                             | 0       | 2    | 3    | 6           |
| RGW044  | 1                             | 0       | 2    | 4    | 7           |
| RGW045  | 1                             | 4       | 3    | 4    | 12          |
| RGW046  | 1                             | 2       | 4    | 6    | 13          |
| RGW047  |                               | 1       | 1    | 1    | 3           |
| RGW048  |                               | 2       | 1    | 5    | 8           |

| Whale # | Number of whale sighting days |      |         |      |             |
|---------|-------------------------------|------|---------|------|-------------|
|         | 2002                          | 2003 | 2004    | 2005 | Total 4 yrs |
| RGW049  |                               | 2    | 0       | 2    | 4           |
| RGW050  |                               | 1    | 2       | 3    | 6           |
| RGW051  |                               | 1    | 1       | 3    | 5           |
| RGW052  |                               | 3    | 6       | 1    | 10          |
| RGW053  |                               | 3    | 4       | 2    | 9           |
| RGW054  |                               | 2    | 0       | 0    | 2           |
| RGW055  |                               | 2    | 3       | 0    | 5           |
| RGW056  |                               | 1    | 0       | 3    | 4           |
| RGW057  |                               | 1    | 1       | 2    | 4           |
| RGW058  |                               | 1    | 0       | 1    | 2           |
| RGW059  |                               | 3    | 2       | 3    | 8           |
| RGW060  |                               | 1    | 0       | 0    | 1           |
| RGW061  |                               | 2    | 2       | 3    | 7           |
| RGW062  |                               | 3    | 0       | 4    | 7           |
| RGW063  |                               | 2    | 2       | 3    | 7           |
| RGW064  |                               | 1    | 3       | 4    | 8           |
| RGW065  |                               | 1    | 2       | 4    | 7           |
| RGW066  |                               | 1    | 4       | 3    | 8           |
| RGW067  |                               | 1    | 3       | 4    | 8           |
| RGW068  |                               | 1    | 0       | 0    | 1           |
| RGW069  |                               | 3    | 1       | 2    | 6           |
| RGW070  |                               | 2    | 1       | 1    | 4           |
| RGW071  |                               | 1    | 4       | 2    | 7           |
| RGW072  |                               | 1    | deleted |      |             |
| RGW073  |                               | 2    | 2       | 2    | 6           |
| RGW074  |                               | 3    | 2       | 3    | 8           |
| RGW075  |                               | 1    | 4       | 2    | 7           |
| RGW076  |                               | 4    | 1       | 3    | 8           |
| RGW077  |                               | 1    | 0       | 0    | 1           |
| RGW078  |                               | 3    | 1       | 1    | 5           |
| RGW079  |                               | 2    | 0       | 0    | 2           |
| RGW080  |                               | 1    | 2       | 1    | 4           |
| RGW081  |                               | 1    | 0       | 0    | 1           |
| RGW082  |                               | 3    | 2       | 5    | 10          |
| RGW083  |                               | 1    | 0       | 3    | 4           |
| RGW084  |                               | 1    | 4       | 0    | 5           |
| RGW085  |                               | 3    | 2       | 4    | 9           |
| RGW086  |                               | 3    | 1       | 2    | 6           |
| RGW087  |                               | 1    | 1       | 4    | 6           |
| RGW088  |                               | 3    | 3       | 0    | 6           |
| RGW089  |                               | 2    | 1       | 5    | 8           |
| RGW090  |                               | 2    | 3       | 2    | 7           |
| RGW091  |                               | 1    | 5       | 2    | 8           |
| RGW092  |                               | 1    | 0       | 0    | 1           |
| RGW093  |                               | 1    | 0       | 0    | 1           |
| RGW094  |                               | 1    | 0       | 0    | 1           |
| RGW095  |                               | 1    | 0       | 4    | 5           |
| RGW096  |                               | 1    | 0       | 0    | 1           |
| RGW097  |                               | 1    | 0       | 0    | 1           |
| RGW098  |                               | 1    | 4       | 3    | 8           |
| RGW099  |                               |      | 1       | 2    | 3           |



| Whale # | Number of whale sighting days |      |      |      |             |
|---------|-------------------------------|------|------|------|-------------|
|         | 2002                          | 2003 | 2004 | 2005 | Total 4 yrs |
| RGW100  |                               |      | 3    | 2    | 5           |
| RGW101  |                               |      | 6    | 1    | 7           |
| RGW102  |                               |      | 4    | 1    | 5           |
| RGW103  |                               |      | 3    | 0    | 3           |
| RGW104  |                               |      | 1    | 0    | 1           |
| RGW105  |                               |      | 1    | 5    | 6           |
| RGW106  |                               |      | 2    | 0    | 2           |
| RGW107  |                               |      | 2    | 0    | 2           |
| RGW108  |                               |      | 3    | 5    | 8           |
| RGW109  |                               |      | 2    | 2    | 4           |
| RGW110  |                               |      | 2    | 1    | 3           |
| RGW111  |                               |      | 1    | 9    | 10          |
| RGW112  |                               |      | 1    | 4    | 5           |
| RGW113  |                               |      | 2    | 2    | 4           |
| RGW114  |                               |      | 1    | 3    | 4           |
| RGW115  |                               |      | 1    | 4    | 5           |
| RGW116  |                               |      | 2    | 0    | 2           |
| RGW117  |                               |      | 4    | 3    | 7           |
| RGW118  |                               |      | 1    | 0    | 1           |
| RGW119  |                               |      | 1    | 1    | 2           |
| RGW120  |                               |      | 1    | 1    | 2           |
| RGW121  |                               |      | 2    | 2    | 4           |
| RGW122  |                               |      | 2    | 3    | 5           |
| RGW123  |                               |      | 1    | 3    | 4           |
| RGW124  |                               |      | 1    | 1    | 2           |
| RGW125  |                               |      | 1    | 4    | 5           |
| RGW126  |                               |      |      | 2    | 2           |
| RGW127  |                               |      |      | 5    | 5           |
| RGW128  |                               |      |      | 3    | 3           |
| RGW129  |                               |      |      | 1    | 1           |
| RGW130  |                               |      |      | 2    | 2           |
| RGW131  |                               |      |      | 2    | 2           |
| RGW132  |                               |      |      | 2    | 2           |
| RGW133  |                               |      |      | 2    | 2           |
| RGW134  |                               |      |      | 6    | 6           |
| RGW135  |                               |      |      | 4    | 4           |
| RGW136  |                               |      |      | 2    | 2           |
| RGW137  |                               |      |      | 1    | 1           |
| RGW138  |                               |      |      | 2    | 2           |
| RGW139  |                               |      |      | 2    | 2           |
| RGW140  |                               |      |      | 2    | 2           |
| RGW141  |                               |      |      | 1    | 1           |
| RGW142  |                               |      |      | 1    | 1           |
| RGW0Q1  |                               |      | 2    |      | 2           |
| RGW0Q2  |                               |      | 1    |      |             |

**66**

**154**

**228**

**326**

**769**

66 sightings

154 sightings

228 sightings

326 sightings

| Whale # | Number of whale sighting days |                         |                         |                          |                                 |
|---------|-------------------------------|-------------------------|-------------------------|--------------------------|---------------------------------|
|         | 2002<br>w/ 47<br>whales       | 2003<br>w/ 81<br>whales | 2004<br>w/ 96<br>whales | 2005<br>w/ 113<br>whales | Total 4<br>yrs<br>138<br>whales |

Table A6. Sighting data for identified gray whales along the northeast Sakhalin Island shelf, 2002-2005.

| Whale number | 2002   | Near-shore/Offshore      | 2003   | Near-shore/Offshore      | 2004   | Near-shore/Offshore             | 2005   | Near-shore/Offshore             | BC Class              | Number sightings with whale ID |
|--------------|--|--------------------------|--|--------------------------|--|---------------------------------|--|---------------------------------|-----------------------|--------------------------------|
| RGW001       |  |                          |  |                          | 2004_09_05<br>2004_09_11<br><br>2004_09_30                         | pil<br>pil<br><br>off           | 2005_07_14<br>2005_08_25   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW002       | 2002_09_11<br>2002_09_14<br>2002_09_14<br>2002_09_23 | off<br>off<br>off<br>off | 2003_08_27<br>2003_08_28<br>2003_09_05<br>2003_09_08 | off<br>off<br>off<br>off | 2004_09_11<br>2004_09_24   | pil<br>pil                      | 2005_07_14<br>2005_07_17<br>2005_07_23<br>2005_08_25<br>2005_09_25 | pil<br>pil<br>pil<br>pil<br>pil | 2<br>2<br>2<br>1<br>0 | 5                              |
| RGW003       | 2002_09_14<br>2002_09_24                             | off<br>off               |  |                          |  |                                 |  |                                 |                       |                                |
| RGW004       | 2002_09_14   | off                      | 2003_08_27<br>2003_09_06                             | off<br>off               |  |                                 |  |                                 |                       |                                |
| RGW005       | 2002_09_23   | off                      | 2003_08_25<br>2003_09_18                             | pil<br>pil               | 2004_09_05<br>2004_09_14<br>2004_09_22<br>2004_09_24<br>2004_09_29 | pil<br>pil<br>pil<br>pil<br>pil | 2005_07_26<br>2005_08_08   | pil<br>pil                      | 4<br>4                | 2                              |
| RGW006       | 2002_09_16<br>2002_09_24                             | off<br>off               | 2003_08_24<br>2003_09_02                             | pil<br>pil               | 2004_08_17<br>2004_09_04   | pil<br>pil                      | 2005_09_08   | N                               | 0<br>0                | (1)                            |
| RGW007       | 2002_09_16   | off                      | 2003_08_18   | off                      | 2004_09_08   | pil                             | 2005_08_09<br>2005_08_20<br>2005_09_01                             | pil<br>pil<br>pil               | 0<br>0<br>0           | 3                              |
| RGW008       | 2002_09_16<br>2002_10_12                             | off<br>off               | 2003_09_18   | off                      | 2004_09_05<br>2004_09_14<br>2004_09_24                             | pil<br>pil<br>pil               | 2005_09_08<br>2005_09_25   | N<br>pil                        | 1<br>0                | 1(1)                           |
| RGW009       | 2002_09_16<br>2002_09_17                             | off<br>off               |  |                          | 2004_08_07<br>2004_09_05   | pil<br>pil                      | 2005_07_17<br>2005_08_20   | pil<br>pil                      | 0<br>0                | 4                              |

| Whale number | 2002                                   | Near-shore/Offshore | 2003                                   | Near-shore/Offshore | 2004                                   | Near-shore/Offshore | 2005   | Near-shore/Offshore                           | BC Class                        | Number sightings with whale ID |
|--------------|--|---------------------|--|---------------------|--|---------------------|--|---|---------------------------------|--------------------------------|
|              |  |                     |  |                     |  |                     | 2005_08_25<br>2005_09_25   | pil<br>pil                                    | 0<br>0                          |                                |
| RGW010       | 2002_09_23                             | off                 |  |                     | IT WAS REMOVED AS COMPOSITE OF RGW009  |                     |  |   |                                 |                                |
| RGW011       | 2002_09_24                             | off                 |  |                     | 2004_09_13<br>2004_09_15<br>2004_09_23 | pil<br>pil<br>pil   | 2005_08_07<br>2005_08_21<br>2005_08_23   | pil<br>pil<br>pil                             | 0<br>0<br>0                     | 3                              |
| RGW012       | 2002_09_24<br>2002_10_10               | off<br>off          | 2003_08_18<br>2003_08_27<br>2003_09_07 | off<br>off<br>off   | 2004_09_05<br>2004_09_10<br>2004_09_23 | pil<br>pil<br>pil   | 2005_07_14<br>2005_07_26<br>2005_08_20<br>2005_08_09<br>2005_08_16<br>2005_08_24<br>2005_08_25 | pil<br>pil<br>pil<br>pil<br>pil<br>pil<br>pil | 2<br>2<br>2<br>2<br>1<br>0<br>0 | 7                              |
| RGW013       | 2002_09_23                             | off                 | 2003_08_28<br>2003_09_05<br>2003_09_13 | off<br>off<br>off   | 2004_08_07<br>2004_09_13<br>2004_09_24 | pil<br>pil<br>pil   | 2005_08_23   | pil   | 0                               | 1                              |
| RGW014       | 2002_09_24                             | off                 | 2003_09_06<br>203_09_10                | off<br>off          | 2004_08_07<br>2004_09_11               | pil<br>pil          | 2005_08_20<br>2005_08_25   | pil<br>pil                                    | 2<br>2                          | 2                              |
| RGW015       | 2002_09_24<br>2002_10_11               | off<br>off          |  |                     | 2004_09_11                             | pil                 | 2005_07_26<br>2005_08_20   | pil<br>pil                                    | 0<br>0                          | 2                              |
| RGW016       | 2002_09_23<br>2002_09_24<br>2002_10_11 | off<br>off<br>off   | 2003_09_07                             | off                 |  |                     | 2005_07_14<br>2005_07_17<br>2005_07_27<br>2005_08_21   | pil<br>pil<br>pil<br>pil                      | 0<br>0<br>0<br>0                | 4                              |
| RGW017       | 2002_09_24<br>2002_10_12               | off<br>off          | 2003_09_04                             | pil                 | 2004_08_29<br>2004_09_13               | pil<br>pil          | 2005_08_08<br>2005_10_01   | pil<br>pil                                    | 0<br>0                          | 2                              |

| Whale number | 2002                                   | Near-shore/Offshore | 2003   | Near-shore/Offshore      | 2004   | Near-shore/Offshore                    | 2005   | Near-shore/Offshore                    | BC Class                   | Number sightings with whale ID |
|--------------|--|---------------------|--|--------------------------|--|--|--|--|----------------------------|--------------------------------|
|              |  |                     |  |                          | 2004_09_22   | pil                                    |  |  |                            |                                |
| RGW018       | 2002_09_24                             | off                 |  |                          |  |  | 2005_07_17<br>2005_08_09<br>2005_09_25   | pil<br>pil<br>pil                      | 0<br>0<br>0                | 3                              |
| RGW019       | 2002_09_28                             | pil                 | 2003_08_25   | pil                      | 2004_09_10   | pil                                    | 2005_07_17<br>2005_07_26<br>2005_08_18<br>2005_08_24<br>2005_09_25<br>2005_10_01 | pil<br>pil<br>pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0<br>0<br>0 | 6                              |
| RGW020       | 2002_09_17<br>2002_09_23<br>2002_09_24 | off<br>off<br>off   | 2003_08_07<br>2003_08_27<br>2003_09_05<br>2003_09_08 | off<br>off<br>off<br>off | 2004_09_05<br>2004_09_11<br>2004_09_14<br>2004_09_15<br>2004_09_21<br>2004_09_30 | pil<br>pil<br>pil<br>pil<br>off<br>off | 2005_08_23   | pil                                    | 3                          | 1                              |
| RGW021       | 2002_09_24                             | off                 | 2003_08_07<br>2003_08_18                             | off<br>off               | 2004_09_05<br>2004_09_10   | pil<br>pil                             | 2005_07_17<br>2005_07_24<br>2005_07_27<br>2005_07_29<br>2005_09_22<br>2005_09_24 | pil<br>pil<br>pil<br>pil<br>pil<br>pil | 2<br>2<br>1<br>1<br>0<br>0 | 6                              |
| RGW022       | 2002_09_24<br>2002_10_10               | off<br>off          | 2003_08_27<br>2003_08_28<br>2003_09_05<br>2003_09_10 | off<br>off<br>off<br>off | 2004_08_07<br>2004_09_14<br>2004_09_18<br>2004_09_23<br>2004_10_01               | pil<br>pil<br>pil<br>pil<br>pil        | 2005_07_26<br>2005_08_07<br>2005_09_25   | pil<br>pil<br>pil                      | 1<br>1<br>0                | 3                              |
| RGW023       | 2002_09_27                             | pil                 |  |                          | 2004_09_10   | pil                                    | 2005_07_14   | pil                                    | 0                          | 2                              |

| Whale number | 2002                                   | Near-shore/Offshore | 2003                                   | Near-shore/Offshore | 2004                                   | Near-shore/Offshore | 2005   | Near-shore/Offshore      | BC Class           | Number sightings with whale ID |
|--------------|--|---------------------|--|---------------------|--|---------------------|--|--------------------------|--------------------|--------------------------------|
|              |  |                     |  |                     | 2004_09_10<br>2004_09_10               | pil<br>pil          | 2005_08_20   | pil                      | 0                  |                                |
| RGW024       | 2002_09_28<br>2002_10_07               | pil<br>pil          |  |                     | 2004_09_05<br>2004_09_10               | pil<br>pil          |  |                          |                    |                                |
| RGW025       | 2002_09_28                             | pil                 |  |                     |  |                     | 2005_07_17<br>2005_09_25                             | pil<br>pil               | 0<br>0             | 2                              |
| RGW026       | 2002_09_28<br>2002_10_10<br>2002_10_11 | pil<br>off<br>off   | 2003_09_07<br>2003_09_13               | off<br>off          | 2004_09_05                             | pil                 | 2005_07_17<br>2005_08_20<br>2005_08_21<br>2005_08_31 | pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0   | 4                              |
| RGW027       | 2002_09_28<br>2002_10_07               | pil<br>pil          | 2003_08_24<br>2003_08_25               | pil<br>pil          |  |                     | 2005_10_01   | pil                      | 0                  | 1                              |
| RGW028       | 2002_10_07                             | pil                 | 2003_08_25<br>2003_09_03               | pil<br>pil          | 2004_09_05                             | pil                 | 2005_07_26<br>2005_07_27<br>2005_08_08<br>2005_08_24 | pil<br>pil<br>pil<br>pil | 4<br>4<br>4<br>3-4 | 4                              |
| RGW029       | 2002_10_11                             | off                 | 2003_08_24<br>2003_08_25<br>2003_09_18 | pil<br>pil<br>pil   | 2004_09_23<br>2004_09_24               | pil<br>pil          | 2005_08_21<br>2005_08_25<br>2005_09_22<br>2005_09_25 | pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0   | 4                              |
| RGW030       | 2002_10_07                             | pil                 | 2003_09_18                             | pil                 | 2004_09_15<br>2004_09_24               | pil<br>pil          | 2005_07_14<br>2005_07_17<br>2005_07_27<br>2005_09_24 | pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0   | 4                              |
| RGW031       | 2002_10_07                             | pil                 |  |                     |  |                     |  |                          |                    |                                |
| RGW032       | 2002_10_07<br>2002_10_15               | pil<br>pil          | 2003_08_15<br>2003_09_03               | pil<br>pil          | 2004_09_05<br>2004_09_11<br>2004_09_24 | pil<br>pil<br>pil   | 2005_07_27<br>2005_08_07<br>2005_08_20               | pil<br>pil<br>pil        | 0<br>0<br>0        | 5                              |

| Whale number | 2002                     | Near-shore/Offshore | 2003   | Near-shore/Offshore      | 2004                                       | Near-shore/Offshore | 2005   | Near-shore/Offshore             | BC Class              | Number sightings with whale ID |
|--------------|--------------------------|---------------------|--|--------------------------|--|---------------------|--|---------------------------------|-----------------------|--------------------------------|
|              |                          |                     |  |                          |  |                     | 2005_09_01<br>2005_09_25   | pil<br>pil                      | 0<br>0                |                                |
| RGW033       | 2002_10_07               | pil                 |  |                          | 2004_09_04                                 | pil                 |  |                                 |                       |                                |
| RGW034       | 2002_09_23<br>2002_09_24 | off<br>off          | 2003_08_25   | pil                      | 2004_08_17<br>2004_09_05                   | pil<br>pil          | 2005_08_07<br>2005_09_01<br>2005_09_25<br>2005_09_25               | pil<br>pil<br>pil<br>pil        | 2<br>1<br>0<br>0      | 4                              |
| RGW035       | 2002_09_23               | off                 | 2003_09_05<br>2003_09_09                             | off<br>off               | 2004_09_10<br>2004_09_23                   | pil<br>pil          | 2005_07_26<br>2005_08_24   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW036       | 2002_09_23<br>2002_09_24 | off<br>off          |  |                          | 2004_09_10                                 | pil                 | 2005_07_27<br>2005_08_08<br>2005_08_20<br>2005_09_22               | pil<br>pil<br>pil<br>pil        | 2<br>2<br>2<br>0      | 4                              |
| RGW037       | 2002_09_23               | off                 | 2003_08_15<br>2003_09_07<br>2003_09_13<br>2003_09_19 | pil<br>off<br>off<br>pil | 2004_09_05<br>2004_09_15<br>2004_09_22     | pil<br>pil<br>pil   | 2005_07_26<br>2005_08_25   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW038       | 2002_09_23               | off                 | 2003_09_05<br>2003_09_07<br>2003_09_13               | off<br>off<br>off        | 2004_09_10                                 | pil                 | 2005_07_26<br>2005_07_27<br>2005_08_20<br>2005_08_25<br>2005_09_01 | pil<br>pil<br>pil<br>pil<br>pil | 2<br>2<br>1<br>1<br>1 | 5                              |
| RGW039       | 2002_10_10<br>2002_10_12 | off<br>off          | 2003_08_25   | pil                      | 2004_09_06<br>2004_09_22<br><br>2004_09_24 | pil<br>pil<br>pil   | 2005_07_26<br>2005_08_16<br>2005_09_22<br>2005_09_24               | pil<br>pil<br>pil               | 4<br>4<br>3           | 3                              |
| RGW040       | 2002_10_10               | off                 | 2003_08_24<br>2003_08_25<br>2003_09_08               | pil<br>pil<br>off        | 2004_08_07<br>2004_08_30<br>2004_09_05     | pil<br>pil<br>pil   |  |                                 |                       |                                |

| Whale number | 2002       | Near-shore/Offshore | 2003   | Near-shore/Offshore      | 2004   | Near-shore/Offshore      | 2005   | Near-shore/Offshore                    | BC Class                     | Number sightings with whale ID |
|--------------|------------|---------------------|--|--------------------------|--|--------------------------|--|--|------------------------------|--------------------------------|
|              |            |                     |  |                          | 2004_09_10<br>2004_09_11<br>2004_09_14               | pil<br>pil<br>pil        |  |  |                              |                                |
| RGW041       | 2002_10_10 | off                 | 2003_08_25<br>2003_09_19                             | pil<br>pil               |  |                          | 2005_07_14<br>2005_07_17   | pil<br>pil                             | 0<br>0                       | 2                              |
| RGW042       | 2002_10_12 | off                 | 2003_09_02   | pil                      | 2004_09_01   | pil                      | 2005_08_21<br>2005_09_01   | pil<br>pil                             | 0<br>0                       | 2                              |
| RGW043       | 2002_10_12 | off                 |  |                          | 2004_09_05<br>2004_09_14                             | pil<br>pil               | 2005_09_01<br>2005_09_25<br>2005_10_01   | pil<br>pil<br>pil                      | 2<br>1<br>0                  | 3                              |
| RGW044       | 2002_10_15 | pil                 |  |                          | 2004_09_11<br>2004_09_23                             | pil<br>pil               | 2005_07_14<br>2005_07_17<br>2005_07_26<br>2005_07_27                             | pil<br>pil<br>pil<br>pil               | 0<br>0<br>0<br>0             | 4                              |
| RGW045       | 2002_09_24 | off                 | 2003_08_23<br>2003_08_25<br>2003_09_05<br>2003_09_08 | pil<br>pil<br>off<br>off | 2004_09_05<br>2004_09_15<br>2004_09_24               | pil<br>pil<br>pil        | 2005_08_08<br>2005_08_16<br>2005_08_25<br>2005_09_07                             | pil<br>pil<br>pil<br>pil               | 2<br>2<br>1<br>1             | 4                              |
| RGW046       | 2002_10_12 | off                 | 2003_09_04<br>2003_09_19                             | pil<br>pil               | 2004_08_30<br>2004_09_05<br>2004_09_24<br>2004_10_01 | pil<br>pil<br>pil<br>pil | 2005_07_17<br>2005_07_24<br>2005_07_26<br>2005_07_27<br>2005_08_25<br>2005_09_25 | pil<br>pil<br>pil<br>pil<br>pil<br>pil | 4<br>4<br>4<br>4<br>4<br>3-4 | 6                              |
| RGW047       | 2002_09_17 | off                 | 2003_08_28   | off                      | 2004_09_06   | off                      | 2005_08_24   | pil                                    |                              | 1                              |
| RGW048       |            |                     | 2003_08_27<br>2003_09_05                             | off<br>off               | 2004_09_24   | off                      | 2005_07_27<br>2005_08_08<br>2005_08_18<br>2005_08_24                             | pil<br>pil<br>pil<br>pil               | 3<br>2<br>2<br>2             | 4/1                            |



| Whale number | 2002 | Near-shore/Offshore | 2003                                   | Near-shore/Offshore | 2004   | Near-shore/Offshore                    | 2005                                   | Near-shore/Offshore | BC Class    | Number sightings with whale ID |
|--------------|------|---------------------|--|---------------------|--|--|--|---------------------|-------------|--------------------------------|
|              |      |                     |  |                     |  |  | 2005_09_06                             | off                 | 1           |                                |
| RGW049       |      |                     | 2003_08_28<br>2003_08_25               | pil<br>pil          |  |  | 2005_08_25<br>2005_09_25               | pil<br>pil          | 0<br>0      | 2                              |
| RGW050       |      |                     | 2003_09_04                             | pil                 | 2004_09_05<br>2004_10_01   | pil<br>pil                             | 2005_07_26<br>2005_08_25<br>2005_09_25 | pil<br>pil<br>pil   | 1<br>1<br>0 | 3                              |
| RGW051       |      |                     | 2003_09_24                             | pil                 | 2004_09_11   | pil                                    | 2005_08_21<br>2005_09_08<br>2005_09_25 | pil<br>N<br>pil     | 1<br>1<br>0 | 2(1)                           |
| RGW052       |      |                     | 2003_08_13<br>2003_08_23<br>2003_08_25 | pil<br>pil<br>pil   | 2004_08_30<br>2004_09_05<br>2004_09_13<br>2004_09_14<br>2004_09_24<br>2004_10_01 | pil<br>pil<br>pil<br>pil<br>pil<br>pil | 2005_09_25                             | pil                 | 0           | 1                              |
| RGW053       |      |                     | 2003_08_07<br>2003_08_29<br>2003_09_13 | off<br>off<br>off   | 2004_09_04<br>2004_09_05<br>2004_09_15<br>2004_09_30                             | pil<br>pil<br>pil<br>off               | 2005_08_20<br>2005_08_25               | pil<br>pil          | 0<br>0      | 2                              |
| RGW054       |      |                     | 2003_08_25<br>2003_09_03               | pil<br>pil          |  |  |  |                     |             |                                |
| RGW055       |      |                     | 2003_08_28<br>2003_09_05               | off<br>off          | 2004_09_15<br>2004_09_24<br>2004_10_01   | pil<br>pil<br>pil                      | IT WAS REMOVED AS COMPOSITE OF RGW018  |                     |             |                                |
| RGW056       |      |                     | 2003_09_03                             | pil                 |  |  | 2005_08_09<br>2005_08_25<br>2005_09_25 | pil<br>pil<br>pil   | 2<br>2<br>0 | 3                              |
| RGW057       |      |                     | 2003_08_27                             | off                 | 2004_09_11   | pil                                    | 2005_08_09<br>2005_08_21               | pil<br>pil          | 1<br>0      | 2                              |

| Whale number | 2002 | Near-shore/Offshore | 2003                                   | Near-shore/Offshore | 2004   | Near-shore/Offshore      | 2005   | Near-shore/Offshore      | BC Class         | Number sightings with whale ID |
|--------------|------|---------------------|--|---------------------|--|--------------------------|--|--------------------------|------------------|--------------------------------|
| RGW058       |      |                     | 2003_08_24                             | pil                 |  |                          | 2005_09_24   | pil                      | 0                | 1                              |
| RGW059       |      |                     | 2003_08_24<br>2003_09_03<br>2003_09_04 | pil<br>pil<br>pil   | 2004_09_10<br>2004_09_23                             | pil<br>pil               | 2005_08_20<br>2005_08_25<br>2005_10_01               | pil<br>pil<br>pil        | 2<br>2<br>0      | 3                              |
| RGW060       |      |                     | 2003_08_07                             | off                 |  |                          |  |                          |                  |                                |
| RGW061       |      |                     | 2003_08_07<br>2003_09_07               | off<br>off          | 2004_09_14<br>2004_09_24                             | pil<br>pil               | 2005_08_25<br>2005_09_25<br>2005_09_25               | pil<br>pil<br>pil        | 2<br>2<br>1      | 3                              |
| RGW062       |      |                     | 2003_09_03<br>2003_09_04<br>2003_09_13 | pil<br>pil<br>off   |  |                          | 2005_08_18<br>2005_08_23<br>2005_08_25<br>2005_09_25 | pil<br>pil<br>pil<br>pil | 2<br>2<br>2<br>0 | 4                              |
| RGW063       |      |                     | 2003_08_23<br>2003_08_25               | pil<br>pil          | 2004_09_10<br>2004_09_23                             | pil<br>pil               | 2005_07_17<br>2005_08_23<br>2005_09_25               | pil<br>pil<br>pil        | 0<br>0<br>0      | 3                              |
| RGW064       |      |                     | 2003_08_24                             | pil                 | 2004_09_04<br>2004_09_11<br>2004_09_24               | pil<br>pil<br>pil        | 2005_08_07<br>2005_09_01<br>2005_09_22<br>2005_09_25 | pil<br>pil<br>pil<br>pil | 1<br>0<br>0<br>0 | 4                              |
| RGW065       |      |                     | 2003_09_04                             | pil                 | 2004_09_06<br>2004_09_29                             | off<br>pil               | 2005_07_23<br>2005_09_01<br>2005_09_22<br>2005_09_25 | pil<br>pil<br>pil<br>pil | 2<br>2<br>2<br>2 | 4                              |
| RGW066       |      |                     | 2003_08_25                             | pil                 | 2004_09_10<br>2004_09_14<br>2004_09_22<br>2004_10_01 | pil<br>pil<br>pil<br>pil | 2005_07_26<br>2005_07_26<br>2005_08_20               | pil<br>pil<br>pil        | 0<br>0<br>0<br>0 | 3                              |
| RGW067       |      |                     | 2003_08_25                             | pil                 | 2004_09_05<br>2004_09_10                             | pil<br>pil               | 2005_07_26<br>2005_07_26                             | pil<br>pil               | 4<br>4           | 4                              |

| Whale number | 2002 | Near-shore/Offshore | 2003   | Near-shore/Offshore      | 2004   | Near-shore/Offshore      | 2005                                   | Near-shore/Offshore | BC Class    | Number sightings with whale ID |
|--------------|------|---------------------|--|--------------------------|--|--------------------------|--|---------------------|-------------|--------------------------------|
|              |      |                     |  |                          | 2004_09_23   | pil                      | 2005_08_20<br>2005_08_25               | pil<br>pil          | 2<br>2      |                                |
| RGW068       |      |                     | 2003_09_04   | pil                      |  |                          |  |                     |             |                                |
| RGW069       |      |                     | 2003_08_18<br>2003_08_28<br>2003_09_10               | off<br>off<br>off        | 2004_09_13   | pil                      | 2005_07_26<br>2005_08_08               | pil<br>pil          | 0<br>0      | 2                              |
| RGW070       |      |                     | 2003_09_03<br>2003_09_04                             | pil<br>pil               | 2004_09_13   | pil                      | 2005_09_22                             | pil                 | 0           | 1                              |
| RGW071       |      |                     | 2003_09_18   | off                      | 2004_09_05<br>2004_09_15<br>2004_09_24<br>2004_10_01 | pil<br>pil<br>pil<br>pil | 2005_09_25<br>2005_10_01               | pil<br>pil          | 2<br>1      | 2                              |
| RGW072       |      |                     | 2003_08_18   | off                      |  |                          |  |                     |             |                                |
| RGW073       |      |                     | 2003_09_03<br>2003_09_18                             | pil<br>pil               | 2004_08_30<br>2004_09_14                             | pil<br>pil               | 2005_08_11<br>2005_09_22               | pil<br>pil          | 0<br>0      | 2                              |
| RGW074       |      |                     | 2003_08_18<br>2003_08_28<br>2003_09_05               | off<br>off<br>off        | 2004_09_05<br>2004_09_10                             | pil<br>pil               | 2005_08_08<br>2005_08_21<br>2005_08_25 | pil<br>pil<br>pil   | 0<br>0<br>0 | 3                              |
| RGW075       |      |                     | 2003_08_15   | pil                      | 2004_09_10<br>2004_09_11<br>2004_09_23<br>2004_09_29 | pil<br>pil<br>pil<br>pil | 2005_08_25<br>2005_09_22               | pil<br>pil          | 2<br>1      | 2                              |
| RGW076       |      |                     | 2003_08_13<br>2003_08_25<br>2003_09_03<br>2003_09_18 | pil<br>pil<br>pil<br>pil | 2004_09_05   | pil                      | 2005_07_27<br>2005_08_20<br>2005_08_24 | pil<br>pil<br>pil   | 2<br>2<br>2 | 3                              |
| RGW077       |      |                     | 2003_08_25   | pil                      |  |                          |  |                     |             |                                |
| RGW078       |      |                     | 2003_08_13<br>2003_09_03                             | pil<br>pil               | 2004_10_01   | pil                      | 2005_10_01                             | pil                 | 0           | 1                              |

| Whale number | 2002 | Near-shore/Offshore | 2003                                       | Near-shore/Offshore   | 2004   | Near-shore/Offshore      | 2005   | Near-shore/Offshore             | BC Class              | Number sightings with whale ID |
|--------------|------|---------------------|--|-----------------------|--|--------------------------|--|---------------------------------|-----------------------|--------------------------------|
|              |      |                     | 2003_09_04                                 | pil                   |  |                          |  |                                 |                       |                                |
| RGW079       |      |                     | 2003_08_25<br>2003_09_03                   | pil<br>pil            |  |                          |  |                                 |                       |                                |
| RGW080       |      |                     | 2003_08_25                                 | pil                   | 2004_09_07<br>2004_09_05                             | pil<br>pil               | 2005_07_14   | pil                             | 0                     | 1                              |
| RGW081       |      |                     | 2003_08_25                                 | pil                   |  |                          |  |                                 |                       |                                |
| RGW082       |      |                     | 2003_08_15<br>2003_08_25<br><br>2003_09_03 | pil<br>pil<br><br>pil | 2004_09_10<br>2004_09_14                             | pil<br>pil               | 2005_07_26<br>2005_08_11<br>2005_09_01<br>2005_09_22<br>2005_09_25 | pil<br>pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0<br>0 | 5                              |
| RGW083       |      |                     | 2003_08_25                                 | pil                   |  |                          | 2005_07_17<br>2005_08_20<br>2005_09_16                             | pil<br>pil<br>pil               | 0<br>0<br>0           | 3                              |
| RGW084       |      |                     | 2003_08_25                                 | pil                   | 2004_09_04<br>2004_09_05<br>2004_09_11<br>2004_09_14 | pil<br>pil<br>pil<br>pil |  |                                 |                       |                                |
| RGW085       |      |                     | 2003_08_25<br>2003_09_03<br>2003_09_18     | pil<br>pil<br>pil     | 2004_09_14<br>2004_09_24                             | pil<br>pil               | 2005_07_17<br>2005_08_11<br>2005_08_21<br>2005_09_01               | pil<br>pil<br>pil<br>pil        | 0<br>0<br>0<br>0      | 4                              |
| RGW086       |      |                     | 2003_08_25<br>2003_09_03<br>2003_09_18     | pil<br>pil<br>pil     | 2004_09_24   | pil                      | 2005_09_22<br>2005_09_25   | pil<br>pil                      | 1<br>1                | 2                              |
| RGW087       |      |                     | 2003_08_25                                 | pil                   | 2004_09_24   | pil                      | 2005_08_21<br>2005_09_01<br>2005_09_22<br>2005_09_25               | pil<br>pil<br>pil<br>pil        | 1<br>1<br>0<br>0      | 4                              |

| Whale number | 2002 | Near-shore/Offshore | 2003                                   | Near-shore/Offshore | 2004   | Near-shore/Offshore             | 2005   | Near-shore/Offshore             | BC Class              | Number sightings with whale ID |
|--------------|------|---------------------|--|---------------------|--|---------------------------------|--|---------------------------------|-----------------------|--------------------------------|
| RGW088       |      |                     | 2003_08_14<br>2003_08_18<br>2003_08_28 | off<br>off<br>off   | 2004_09_05<br>2004_09_11<br>2004_09_13                             | pil<br>pil<br>pil               |  |                                 |                       |                                |
| RGW089       |      |                     | 2003_08_18<br>2003_09_07               | off<br>off          | 2004_09_05   | pil                             | 2005_08_07<br>2005_08_11<br>2005_08_24<br>2005_09_24<br>2005_09_25 | pil<br>pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0<br>0 | 5                              |
| RGW090       |      |                     | 2003_09_08<br>2003_09_13               | off<br>off          | 2004_09_10<br>2004_09_13<br>2004_09_14                             | pil<br>pil<br>pil               | 2005_08_24<br>2005_08_25   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW091       |      |                     | 2003_09_18                             | off                 | 2004_09_04<br>2004_09_05<br>2004_09_08<br>2004_09_11<br>2004_09_18 | pil<br>pil<br>pil<br>pil<br>pil | 2005_07_14<br>2005_09_22   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW092       |      |                     | 2003_08_07                             | off                 |  |                                 |  |                                 |                       |                                |
| RGW093       |      |                     | 2003_08_13                             | pil                 | IT WAS REMOVED AS COMPOSITE OF RGW056                              |                                 |  |                                 |                       |                                |
| RGW094       |      |                     | 2003_09_18                             | pil                 |  |                                 |  |                                 |                       |                                |
| RGW095       |      |                     | 2003_08_13                             | pil                 |  |                                 | 2005_08_07<br>2005_08_08<br>2005_08_23<br>2005_08_25               | pil<br>pil<br>pil<br>pil        | 0<br>0<br>0<br>0      | 4                              |
| RGW096       |      |                     | 2003_08_15                             | pil                 |  |                                 |  |                                 |                       |                                |
| RGW097       |      |                     | 2003_09_18                             | off                 |  |                                 |  |                                 |                       |                                |
| RGW098       |      |                     | 2004_08_26                             | pil                 | 2004_08_26<br>2004_08_29<br>2004_09_06<br>2004_09_28               | pil<br>pil<br>pil<br>pil        | 2005_07_14<br>2005_07_17<br>2005_07_17                             | pil<br>pil<br>pil               | 0<br>0<br>0           | 3                              |

| Whale number | 2002 | Near-shore/Offshore | 2003 | Near-shore/Offshore | 2004   | Near-shore/Offshore                    | 2005   | Near-shore/Offshore             | BC Class              | Number sightings with whale ID |
|--------------|------|---------------------|------|---------------------|--|--|--|---------------------------------|-----------------------|--------------------------------|
| RGW099       |      |                     |      |                     | 2004_09_10   | pil                                    | 2005_08_25<br>2005_09_22   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW100       |      |                     |      |                     | 2004_08_30<br>2004_09_18<br>2004_09_18   | pil<br>pil<br>pil                      | 2005_07_26<br>2005_08_24   | pil<br>pil                      | 0<br>0                | 2                              |
| RGW101       |      |                     |      |                     | 2004_08_30<br>2004_09_05<br>2004_09_13<br>2004_09_14<br>2004_09_23<br>2004_09_24 | pil<br>pil<br>pil<br>pil<br>pil<br>pil |  |                                 | 0                     |                                |
| RGW102       |      |                     |      |                     | 2004_08_30<br>2004_09_05<br>2004_09_24<br>2004_10_01                             | pil<br>pil<br>pil<br>pil               | 2005_09_24   | pil                             | 0                     | 1                              |
| RGW103       |      |                     |      |                     | 2004_09_08<br>2004_09_10<br>2004_09_20   | pil<br>pil<br>off                      |  |                                 |                       |                                |
| RGW104       |      |                     |      |                     | 2004_09_14   | pil                                    |  |                                 |                       |                                |
| RGW105       |      |                     |      |                     | 2004_09_05   | pil                                    | 2005_07_26<br>2005_07_27<br>2005_08_20<br>2005_09_01<br>2005_09_22 | pil<br>pil<br>pil<br>pil<br>pil | 2<br>2<br>2<br>1<br>0 | 5                              |
| RGW106       |      |                     |      |                     | 2004_09_14<br>2004_09_15   | pil<br>pil                             |  |                                 |                       |                                |
| RGW107       |      |                     |      |                     | 2004_09_05<br>2004_09_10   | pil<br>pil                             |  |                                 |                       |                                |
| RGW108       |      |                     |      |                     | 2004_09_13   | pil                                    | 2005_08_20   | pil                             | 1                     | 5                              |

| Whale number | 2002 | Near-shore/Offshore | 2003 | Near-shore/Offshore | 2004                     | Near-shore/Offshore | 2005   | Near-shore/Offshore   | BC Class                                  | Number sightings with whale ID |
|--------------|------|---------------------|------|---------------------|--------------------------|---------------------|--|---|---|--------------------------------|
|              |      |                     |      |                     | 2004_09_14<br>2004_09_24 | pil<br>pil          | 2005_08_23<br>2005_09_22<br>2005_09_24<br>2005_09_01   | pil<br>pil<br>pil<br>pil                                    | 1<br>0<br>0<br>0                          |                                |
| RGW109       |      |                     |      |                     | 2004_09_05<br>2004_09_11 | pil<br>pil          | 2005_08_20<br>2005_08_25   | pil<br>pil  | 0<br>0                                    | 2                              |
| RGW110       |      |                     |      |                     | 2004_09_15<br>2004_09_30 | pil<br>off          | 2005_08_25   | pil   | 1   | 1                              |
| RGW111       |      |                     |      |                     | 2004_09_11               | pil                 | 2005_07_14<br>2005_07_24<br>2005_07_27<br>2005_08_23<br>2005_09_07<br>2005_09_22<br>2005_09_24<br>2005_09_25<br>2005_09_25 | pil<br>pil<br>pil<br>pil<br>pil<br>pil<br>pil<br>pil<br>pil | 1<br>1<br>1<br>1<br>1<br>1<br>0<br>0<br>0 | 9                              |
| RGW112       |      |                     |      |                     | 2004_09_14               | pil                 | 2005_07_27<br>2005_08_23<br>2005_09_01<br>2005_09_01   | pil<br>pil<br>pil<br>pil                                    | 0<br>0<br>0<br>0                          | 4                              |
| RGW113       |      |                     |      |                     | 2004_09_13<br>2004_09_14 | pil<br>pil          | 2005_09_01<br>2005_09_25   | pil<br>pil  | 0<br>0                                    | 2                              |
| RGW114       |      |                     |      |                     | 2004_09_05               | pil                 | 2005_08_25<br>2005_09_22<br>2005_09_25   | pil<br>pil<br>pil   | 0<br>0<br>0                               | 3                              |
| RGW115       |      |                     |      |                     | 2004_09_10               | pil                 | 2005_07_14<br>2005_07_26<br>2005_08_20   | pil<br>pil<br>pil   | 0<br>0<br>0                               | 4                              |

| Whale number | 2002               | Near-shore/Offshore | 2003 | Near-shore/Offshore | 2004   | Near-shore/Offshore      | 2005   | Near-shore/Offshore      | BC Class         | Number sightings with whale ID |
|--------------|--------------------|---------------------|------|---------------------|--|--------------------------|--|--------------------------|------------------|--------------------------------|
|              |                    |                     |      |                     |  |                          | 2005_09_24   | pil                      | 0                |                                |
| RGW116       |                    |                     |      |                     | 2004_09_08<br>2004_10_01                             | pil<br>pil               |  |                          |                  |                                |
| RGW117       |                    |                     |      |                     | 2004_09_08<br>2004_09_18<br>2004_09_24<br>2004_10_01 | pil<br>pil<br>pil<br>pil | 2005_07_17<br>2005_07_24<br>2005_09_23               | pil<br>pil<br>off        | 2<br>2<br>0      | 2/1                            |
| RGW118       |                    |                     |      |                     | 2004_09_29   | pil                      |  |                          |                  |                                |
| RGW119       |                    |                     |      |                     | 2004_09_05   | pil                      | 2005_08_25   | pil                      | 0                | 1                              |
| RGW120       |                    |                     |      |                     | 2004_09_14   | pil                      | 2005_09_22   | pil                      | 0                | 1                              |
| RGW121       |                    |                     |      |                     | 2004_09_23<br>2004_10_01                             | pil<br>pil               | 2005_08_08<br>2005_08_23                             | pil<br>pil               | 0<br>0           | 2                              |
| RGW122       |                    |                     |      |                     | 2004_09_05<br>2004_09_23                             | pil<br>pil               | 2005_08_20<br>2005_09_25<br>2005_10_01               | pil<br>pil<br>pil        | 0<br>0<br>0      | 3                              |
| RGW123       |                    |                     |      |                     | 2004_09_29   | pil                      | 2005_07_26<br>2005_08_20<br>2005_08_24               | pil<br>pil<br>pil        | 0<br>0<br>0      | 3                              |
| RGW124       | WAS RGW0Q3 IN 2004 |                     |      |                     | 2004_09_05   | pil                      | 2005_07_17   | pil                      |                  | 1                              |
| RGW125       | WAS RGW0Q3 IN 2004 |                     |      |                     | 2004_09_13   | pil                      | 2005_07_17<br>2005_08_08<br>2005_08_25<br>2005_09_24 | pil<br>pil<br>pil<br>pil | 2<br>1<br>0<br>0 | 4                              |
| RGW126       |                    |                     |      |                     |  |                          | 2005_07_24<br>2005_08_20                             | pil<br>pil               | 0<br>0           | 2                              |
| RGW127       |                    |                     |      |                     |  |                          | 2005_07_17<br>2005_07_26<br>2005_08_18<br>2005_08_20 | pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0 | 5                              |



| Whale number | 2002 | Near-shore/Offshore | 2003 | Near-shore/Offshore | 2004 | Near-shore/Offshore | 2005   | Near-shore/Offshore                    | BC Class                   | Number sightings with whale ID |
|--------------|------|---------------------|------|---------------------|------|---------------------|--|--|----------------------------|--------------------------------|
|              |      |                     |      |                     |      |                     | 2005_08_23   | pil                                    | 0                          |                                |
| RGW128       |      |                     |      |                     |      |                     | 2005_08_08<br>2005_08_20<br>2005_08_25   | pil<br>pil<br>pil                      | 1<br>1<br>1                | 3                              |
| RGW129       |      |                     |      |                     |      |                     | 2005_09_23   | off                                    | 2                          | /1                             |
| RGW130       |      |                     |      |                     |      |                     | 2005_07_27<br>2005_08_20   | pil<br>pil                             | 0<br>0                     | 2                              |
| RGW131       |      |                     |      |                     |      |                     | 2005_09_08   | EI<br>EI                               | 1<br>1                     | [2]                            |
| RGW132       |      |                     |      |                     |      |                     | 2005_08_21<br>2005_09_08   | pil<br>N                               | 0<br>0                     | 1(1)                           |
| RGW133       |      |                     |      |                     |      |                     | 2005_07_26<br>2005_08_08   | pil<br>pil                             | 0<br>0                     | 2                              |
| RGW134       |      |                     |      |                     |      |                     | 2005_07_26<br>2005_07_26<br>2005_07_27<br>2005_08_24<br>2005_09_16<br>2005_09_24 | pil<br>pil<br>pil<br>pil<br>pil<br>pil | 0<br>0<br>0<br>0<br>0<br>0 | 6                              |
| RGW135       |      |                     |      |                     |      |                     | 2005_07_26<br>2005_07_26<br>2005_08_16<br>2005_09_22                             | pil<br>pil<br>pil<br>pil               | 0<br>0<br>0<br>0           | 4                              |
| RGW136       |      |                     |      |                     |      |                     | 2005_07_23<br>2005_09_20   | pil<br>pil                             | 0<br>0                     | 2                              |
| RGW137       |      |                     |      |                     |      |                     | 2005_09_25   | pil                                    | 0                          | 1                              |
| RGW138       |      |                     |      |                     |      |                     | 2005_09_22<br>2005_09_25   | pil<br>pil                             | 0<br>0                     | 2                              |
| RGW139       |      |                     |      |                     |      |                     | 2005_09_22   | pil                                    | 0                          | 2                              |

| Whale number | 2002 | Near-shore/Offshore | 2003 | Near-shore/Offshore | 2004       | Near-shore/Offshore | 2005       | Near-shore/Offshore | BC Class | Number sightings with whale ID |
|--------------|------|---------------------|------|---------------------|------------|---------------------|------------|---------------------|----------|--------------------------------|
|              |      |                     |      |                     |            |                     | 2005_09_24 | pil                 | 0        |                                |
| RGW140       |      |                     |      |                     |            |                     | 2005_09_25 | pil                 | 0        | 2                              |
|              |      |                     |      |                     |            |                     | 2005_10_01 | pil                 | 0        |                                |
| RGW141       |      |                     |      |                     |            |                     | 2005_10_01 | pil                 | 2        | 1                              |
| RGW142       |      |                     |      |                     |            |                     | 2005_09_25 | pil                 | 0        | 1                              |
| RGW0Q1       |      |                     |      |                     | 2004_09_05 | pil                 |            |                     |          |                                |
|              |      |                     |      |                     | 2004_09_13 | pil                 |            |                     |          |                                |
| RGW0Q2       |      |                     |      |                     | 2004_09_04 | pil                 |            |                     |          |                                |

Table A7. Observation records for individual gray whales from 2002-2005 including observed cows and calves and notable physical body parameters.

| Whale number | Years                                   |      | Mother calf | BC Class | Skin Condition | Year 2004 | Mother calf | BC Class | Skin Condition | Year 2005 | Mother calf | BC Class | Skin Condition |
|--------------|---|------|-------------|----------|----------------|-----------|-------------|----------|----------------|-----------|-------------|----------|----------------|
|              | 2002                                    | 2003 |             |          |                |           |             |          |                |           |             |          |                |
| RGW001       | x                                       |      | COW         | 0        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW002       | x                                       | x    |             | 1        | 0              | x         |             | 1        | 0              | x         |             | 0        | 0              |
| RGW003       | x                                       |      |             |          |                |           |             |          |                |           |             |          |                |
| RGW004       | x                                       | x    |             | 0        | 0              |           |             |          |                |           |             |          |                |
| RGW005       | x                                       | x    |             | 2-3      | 0              | x         |             | 0        | 0              | x         | COW         | 4        | 0              |
| RGW006       | x                                       | x    |             | 0        | 0              | x         |             | 2        | 0              | x         |             | 0        | 0              |
| RGW007       | x                                       | x    |             | 0        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW008       | x                                       | x    |             | 3        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW009       | x                                       |      |             |          |                | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW010       | IT WAS REMOVED AS A COMPOSITE OF RGW009 |      |             |          |                |           |             |          |                |           |             |          |                |
| RGW011       | x                                       |      | COW         |          |                | x         |             | 1        | 0              | x         |             | 1        | 1              |
| RGW012       | x                                       | x    |             | 1        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW013       | x                                       | x    |             | 1        | 0              | x         |             | 1        | 0              | x         |             | 1        | 0              |
| RGW014       | x                                       | x    |             | 2        | 0              | x         |             | 0        | 0              | x         |             | 2        | 0              |
| RGW015       | x                                       |      |             |          |                | x         |             | 1        | 0              | x         |             | 0        | 0              |
| RGW016       | x                                       | x    |             | 0        | 0              |           |             |          |                | x         |             | 0        | 0              |
| RGW017       | x                                       | x    |             | 0        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW018       | x                                       |      |             |          |                |           |             |          |                | x         |             | 0        | 0              |
| RGW019       | x                                       | x    |             | 2        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW020       | x                                       | x    |             | 2        | 0              | x         |             | 0        | 0              | x         |             | 3        | 0              |
| RGW021       | x                                       | x    |             | 0        | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW022       | x                                       | x    |             | 0        | 0              | x         |             | 2        | 0              | x         |             | 0        | 0              |
| RGW023       | x                                       |      |             |          | 0              | x         |             | 0        | 0              | x         |             | 0        | 0              |
| RGW024       | x                                       |      |             |          |                | x         |             | 0        | 0              |           |             |          | 0              |
| RGW025       | x                                       |      |             |          |                |           |             |          |                | x         |             | 0        | 0              |

| Whale<br>number | Years |      | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2004 | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2005 | Mother<br>calf | BC<br>Class | Skin<br>Condition |
|-----------------|-------|------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|
|                 | 2002  | 2003 |                |             |                   |              |                |             |                   |              |                |             |                   |
| RGW026          | x     | x    |                | 1           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW027          | x     | x    | cow            | 2           | 2                 |              |                |             |                   | x            |                | 0           | 0                 |
| RGW028          | x     | x    | cow            | 4           | 2                 | x            |                | 2           | 0                 | x            | cow            | 3-4         | 0                 |
| RGW029          | x     | x    |                | 0           | от 1 до 3         | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW030          | x     | x    |                | 0           | 0                 | x            |                | 1           | 0                 | x            |                | 0           | 0                 |
| RGW031          | x     |      |                |             |                   |              |                |             |                   |              |                |             |                   |
| RGW032          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW033          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 |              |                |             |                   |
| RGW034          | x     | x    | cow?           | 0           | 1                 | x            |                | 1           | 0                 | x            |                | 0           | 0                 |
| RGW035          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW036          | x     |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 2                 |
| RGW037          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW038          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                | 1           | 0                 |
| RGW039          | x     | x    | cow            | 2           | 0                 | x            |                | 0           | 0                 | x            | cow            | 3           | 0                 |
| RGW040          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 |              |                |             |                   |
| RGW041          | x     | x    | cow            | 3           | 0                 |              |                |             |                   | x            |                | 0           | 0                 |
| RGW042          | x     | x    | cow            | 2           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW043          | x     |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW044          | x     |      |                |             |                   | x            |                | 0           | 1                 | x            |                | 0           | 1                 |
| RGW045          | x     | x    |                | 1           | 0                 | x            |                | 0           | 0                 | x            |                | 1           | 0                 |
| RGW046          | x     | x    |                | 2           | 0                 | x            |                | 3           | 0                 | x            |                | 3-4         | 0                 |
| RGW047          | x     | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW048          |       | x    |                | 0           | 0                 | x            |                | 2           | 0                 | x            |                | 0           | 0                 |
| RGW049          |       | x    |                | 0           | 1                 |              |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW050          |       | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                | 0           | 0                 |

| Whale number | Years                                   |      | Mother calf | BC Class | Skin Condition | Year 2004 | Mother calf | BC Class | Skin Condition | Year 2005         | Mother calf | BC Class | Skin Condition |
|--------------|---|------|-------------|----------|----------------|-----------|-------------|----------|----------------|-------------------|-------------|----------|----------------|
|              | 2002                                    | 2003 |             |          |                |           |             |          |                |                   |             |          |                |
| RGW051       |   | x    |             | 2        | 2              | x         |             | 0        | 0              | x                 |             | 0        | 0              |
| RGW052       |   | x    |             | 0        | 2              | x         | cow         | 3        | 1              | x                 |             | 0        | 0              |
| RGW053       |   | x    |             | 0        | 0              | x         |             | 2        | 0              | x                 |             | 0        | 0              |
| RGW054       |   | x    | calf ?      | 0        | 0              |           |             |          |                |                   |             |          |                |
| RGW055       |   | x    |             | 0        | 0              | x         |             | 1        | 0              | REMOVED to RGW018 |             |          |                |
| RGW056       |   | x    | cow ?       | 0        | 0              |           |             |          |                | x                 |             | 0        | 0              |
| RGW057       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 |             | 0        | 0              |
| RGW058       |   | x    |             | 0        | 0              |           |             |          |                | x                 |             | 0        | 0              |
| RGW059       |   | x    |             | 0        | от1 до 3       | x         |             | 1        | 0              | x                 |             | 0-1      | 0              |
| RGW060       |   | x    |             | 0        | 0              |           |             |          |                |                   |             |          |                |
| RGW061       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 |             | 1        | 0              |
| RGW062       |   | x    |             | 0        | 0              |           |             |          |                | x                 |             | 0        | 0              |
| RGW063       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 |             | 0        | 0              |
| RGW064       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 |             | 0        | 0              |
| RGW065       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 | cow         | 2        | 0              |
| RGW066       |   | x    | cow         | 2        | 0              | x         |             | 1        | 0              | x                 |             | 0        | 0              |
| RGW067       |   | x    |             | 0        | 0              | x         | cow         | 2        | 0              | x                 |             | 2        | 0              |
| RGW068       |   | x    |             | 0        | 0              |           |             |          |                |                   |             |          |                |
| RGW069       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 |             | 0        | 0              |
| RGW070       |   | x    |             | 0        | 0              |           |             |          |                | x                 |             | 0        | 0              |
| RGW071       |   | x    |             | 2        | 1              | x         |             | 0        | 0              | x                 |             | 0        | 0              |
| RGW072       | IT WAS REMOVED AS A COMPOSITE OF RGW033 |      |             |          |                |           |             |          |                |                   |             |          |                |
| RGW073       |   | x    | calf ?      | 0        | 0              | x         |             | 1        | 0              | x                 |             | 0        | 0              |
| RGW074       |   | x    |             | 2        | 0              | x         |             | 1        | 0              | x                 |             | 0        | 0              |
| RGW075       |   | x    |             | 0        | 0              | x         |             | 0        | 0              | x                 |             | 1        | 0              |

| Whale<br>number | Years |      | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2004 | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2005 | Mother<br>calf    | BC<br>Class | Skin<br>Condition |
|-----------------|-------|------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|--------------|-------------------|-------------|-------------------|
|                 | 2002  | 2003 |                |             |                   |              |                |             |                   |              |                   |             |                   |
| RGW076          |       | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW077          |       | x    |                | 0           | 0                 |              |                |             |                   |              |                   |             |                   |
| RGW078          |       | x    | calf           | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW079          |       | x    | calf           | 0           | 0                 |              |                |             |                   |              |                   |             |                   |
| RGW080          |       | x    | calf           | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW081          |       | x    | calf           | 0           | 0                 |              |                |             |                   |              |                   |             |                   |
| RGW082          |       | x    | calf           | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW083          |       | x    | calf           | 0           | 0                 |              |                |             |                   | x            |                   | 0           | 0                 |
| RGW084          |       | x    | calf           | 0           | 0                 | x            |                | 1           | 0                 |              |                   |             |                   |
| RGW085          |       | x    | calf           | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW086          |       | x    | calf           | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW087          |       | x    | calf ?         | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW088          |       | x    |                | 1           | 0                 | x            |                | 0           | 0                 |              |                   |             |                   |
| RGW089          |       | x    |                | 0           | 0                 | x            |                | 1           | 0                 | x            |                   | 0           | 0                 |
| RGW090          |       | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW091          |       | x    |                | 0           | 0                 | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW092          |       | x    |                | 0           | 0                 |              |                | 0           | 0                 |              |                   |             |                   |
| RGW093          |       | x    |                | 0           | 0                 |              |                | 0           | 0                 |              | REMOVED to RGW056 |             |                   |
| RGW094          |       | x    |                | 0           | 0                 |              |                | 0           | 0                 |              |                   |             |                   |
| RGW095          |       | x    |                | 0           | 0                 |              |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW096          |       | x    |                | 0           | 0                 |              |                | 0           | 0                 |              |                   |             |                   |
| RGW097          |       | x    |                | 0           | 0                 |              |                | 0           | 0                 |              |                   |             |                   |
| RGW098          |       | x    |                | 0           | 0                 | x            |                | 2           | 0                 | x            |                   |             | 0                 |
| RGW099          |       |      |                |             |                   | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |
| RGW100          |       |      |                |             |                   | x            |                | 0           | 0                 | x            |                   | 0           | 0                 |

| Whale<br>number | Years              |      | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2004 | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2005 | Mother<br>calf | BC<br>Class | Skin<br>Condition |
|-----------------|--------------------|------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|
|                 | 2002               | 2003 |                |             |                   |              |                |             |                   |              |                |             |                   |
| RGW101          |                    |      |                |             |                   | x            | calf           | 0           | 0                 |              |                |             |                   |
| RGW102          |                    |      |                |             |                   | x            |                | 1           | 0                 | x            |                | 0           | 0                 |
| RGW103          |                    |      |                |             |                   | x            |                | 0           | 0                 |              |                |             |                   |
| RGW104          |                    |      |                |             |                   | x            |                | 0           | 0                 |              |                |             |                   |
| RGW105          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW106          |                    |      |                |             |                   | x            |                | 3           | 0                 |              |                |             |                   |
| RGW107          |                    |      |                |             |                   | x            | calf           | 0           | 0                 |              |                |             |                   |
| RGW108          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW109          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW110          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 1           | 0                 |
| RGW111          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW112          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW113          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW114          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW115          |                    |      |                |             |                   | x            |                | 1           | 0                 | x            |                | 0           | 0                 |
| RGW116          |                    |      |                |             |                   | x            |                | 0           | 0                 |              |                |             |                   |
| RGW117          |                    |      |                |             |                   | x            |                | 2           | 0                 | x            |                | 0           | 0                 |
| RGW118          |                    |      |                |             |                   | x            |                | 0           | 0                 |              |                |             |                   |
| RGW119          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW120          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW121          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW122          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW123          |                    |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW124          | WAS RGW0Q3 IN 2004 |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |
| RGW125          | WAS RGW0Q4 IN 2004 |      |                |             |                   | x            |                | 0           | 0                 | x            |                | 0           | 0                 |

| Whale<br>number | Years |      | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2004 | Mother<br>calf | BC<br>Class | Skin<br>Condition | Year<br>2005 | Mother<br>calf | BC<br>Class | Skin<br>Condition |
|-----------------|-------|------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|--------------|----------------|-------------|-------------------|
|                 | 2002  | 2003 |                |             |                   |              |                |             |                   |              |                |             |                   |
| RGW126          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW127          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW128          |       |      |                |             |                   |              |                |             |                   | x            |                | 1           | 0                 |
| RGW129          |       |      |                |             |                   |              |                |             |                   | x            |                | 2           | 0                 |
| RGW130          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW131          |       |      |                |             |                   |              |                |             |                   | x            |                | 1           | 0                 |
| RGW132          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW133          |       |      |                |             |                   |              |                |             |                   | x            | calf           | 0           | 0                 |
| RGW134          |       |      |                |             |                   |              |                |             |                   | x            | calf           | 0           | 0                 |
| RGW135          |       |      |                |             |                   |              |                |             |                   | x            | calf           | 0           | 0                 |
| RGW136          |       |      |                |             |                   |              |                |             |                   | x            | calf           | 0           | 0                 |
| RGW137          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW138          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW139          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW140          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW141          |       |      |                |             |                   |              |                |             |                   | x            |                | 2           | 0                 |
| RGW142          |       |      |                |             |                   |              |                |             |                   | x            |                | 0           | 0                 |
| RGW0Q1          |       |      |                |             |                   | x            |                | 0           | 0                 |              |                |             |                   |
| RGW0Q2          |       |      |                |             |                   | x            |                | 0           | 0                 |              |                |             |                   |

Обозначения: мать - cow, детеныш - calf, норма - 0.