Occurrence of Marine Mammals and Birds in the Nass Marine Area, with a Focus on the Lower Nass River, British Columbia, during the 2007 Eulachon Run

Prepared by

Meike Holst and Mike Demarchi
LGL Limited
environmental research associates
9768 Second Street
Sidney, BC V8L 3Y8

and

Tracy McKay
Nisga'a Fish and Wildlife Department
P.O. Box 228
New Aiyansh, BC V0J 1A0

Prepared for

Integrated Coastal Zone Management
Fisheries and Oceans Canada
Oceans, Habitat and Enhancement Branch
North Coast Area
417 2nd Avenue West
Prince Rupert, BC V8J 1G8

5 April 2007

Introduction

The environmental assessment and planning of any future industrial developments (e.g., marine protected areas, shipping, oil and gas exploration and development, mining) in the Nass Marine Area will require access to detailed information on the seasonal distributions and important habitats for marine mammals and marine-associated birds. Presently, such information is lacking in most cases.

As noted by anecdotal reports and limited scientific investigation, the large numbers of birds, sea lions, and seals that gather in and near the lower Nass River during the annual eulachon run in late winter presents an opportunity to obtain detailed information on species abundance and distribution. Although eulachon catch data for the lower Nass River have been collected during most years since 1992, the only systematic data for marine mammals and birds were recorded in the mid 1990s in conjunction with the Environmental Assessment of the Greenville to Kincolith Highway (see Demarchi 1997). To begin to fill this information gap, surveys took place in late February through March 2007 to examine the occurrence of marine mammals and marine-associated birds in the Nass Marine Area.

The objectives of the study were to:

1. Determine the Nass River eulachon harvest for the 2007 season;
2. Determine the distribution of marine mammals in the Nass Marine Area;
3. Determine the distribution and relative abundance of marine mammals in the lower Nass River between Greenville and Kincolith;
4. Determine the distribution and relative abundance of birds in the lower Nass River;
5. Examine the distribution and abundance patterns of marine mammals and birds in light of the timing and abundance of the eulachon run;
6. Develop a long-term, repeatable study design; and
7. Build the capacity of Nisga'a Fish and Wildlife Department staff to collect and organize biological data.

Methods

Eulachon Catch Monitoring

Seven fishing camps operated during the eulachon run; six of these were located in Fishery Bay and operated by Nisga'a, and one camp was located near Red Bluff and operated by Tsimshian. Eulachon fishing started on 5 March and ended on 25 March. All seven fishing camps were visited regularly throughout this period. Each camp was visited one or more times a week as necessary to obtain data on fishing effort (number of casts, number of trips out, time spent fishing, etc.) and catch (in pounds or tons). This information was obtained by interviewing the fishermen in each of the camps. Some camps kept notes on their daily catches. The catch weight was estimated at each camp by the size of the container the fish filled. The interviewer then noted all of this information on paper and later entered the data into a computer spreadsheet. Interviews were conducted from 6–31 March.

Aerial Survey

To determine the distribution of marine mammals in the Nass Marine Area during the eulachon run, a single aerial survey was flown in a DeHavilland Beaver on 18 March 2007. The survey included the waters of Portland Inlet, Portland Canal, Observatory Inlet, and the lower Nass River (Appendix A). Two observers, one on each side of the plane, made observations through bubble windows in the rear of the plane. A third observer was located in the co-pilot's seat. When a marine mammal was sighted, the species, number of individuals, and location were noted on a map.

The aerial survey commenced at 10:30 and was completed by 13:35 (~3 hr); low tide was 1.1 m at 8 am[1]. The survey was flown at an altitude of 100 to 150 m above sea level at speeds of 160 to 200 km/hr. The Beaufort Wind Force was variable during the survey and ranged from 1 to 4 (up to 15 knots). Environmental conditions for sighting marine mammals were excellent.

Boat Surveys

Weekly boat surveys in the lower Nass River were planned for late February through March 2007 using the 6.5-m aluminum river boat, *Ksi Lisims*. The boat had a 250-hp outboard engine and a cabin from which the observers could make their observations. The survey area was divided into 8 zones (Fig. 1). A total of four surveys took place: 27 February (zones 1–5), 7 March (zones 1–8), 13 March (zone 1), and 27 March (zones 1–6). The boat was unavailable for surveys between 13–27 March.

Surveys took place at higher tidal levels when the river, which is tidal upriver to Greenville, was navigable. An attempt was made to survey each zone at least once during every survey. However, poor weather (e.g., high winds, snow) did not allow for complete survey coverage on most days. During the surveys, a boat speed of 9.3 km/hr was generally maintained. A Garmin 12 GPS was used to record the boat track.

Two observers (three on 27 February) scanned the area for marine mammals and birds, alternating between unaided eyes and 10 x 50 Bushnell binoculars. For each sighting, the species, number of individuals, direction of travel, behavior, and age group of bald eagles were written on data sheets (see example in Appendix B). In addition, environmental variables (sea state, wind, temperature, cloud cover, tide) were noted. Double-counting of animals was avoided by conducting the survey at a steady speed and not counting circling birds more than once.

Shore-based Surveys

Surveys from shore took place 1–3 times per week from 28 February through 26 March. Five easily-accessible locations along Highway 113 between Greenville and Kincolith were chosen as observation points. The locations of the observation points (Fig. 1) and corresponding zones were: Kincolith (zone 8), Xnukw (zone 5), Red Bluff (zone 4), Fishery Bay (zone 2), and Greenville (zone 1). More sites (in particular in other zones) were not chosen because of limited road access to the shore and avalanche hazards in the area. The entire zone was not visible from the survey points. Generally, from the

[1] Source: http://www.tides.gc.ca/

observation site, the observer(s) could see across the river as well as ~1 km down and up river (unless the view was obstructed by trees or a bend in the river).

Counts of marine mammals and birds from shore were made once a day (usually in the morning) on 10 survey days. All surveys took place between 07:30 am and 13:40. The surveys were typically done by two observers; one observer called out sightings and the other recorded the information on paper data sheets. Three observers were on site on 28 February and 19 March. Observers used 10 x 50 binoculars as well as an 18-36 x 50 Bushnell spotting scope on a tripod to view birds on the far side of the river. At each observation point, the total number of birds and marine mammals seen within a 10-min period were recorded. Sightings included flying birds, birds on the water, birds perched in trees, and marine mammals. Direction of travel, behaviour, and environmental variables (sea state, wind, temperature, cloud cover, tide) were noted. In addition, the age group for bald eagles was also noted. To avoid counting the same animal more than once, the surveys were kept as short as possible (i.e., 10 min).

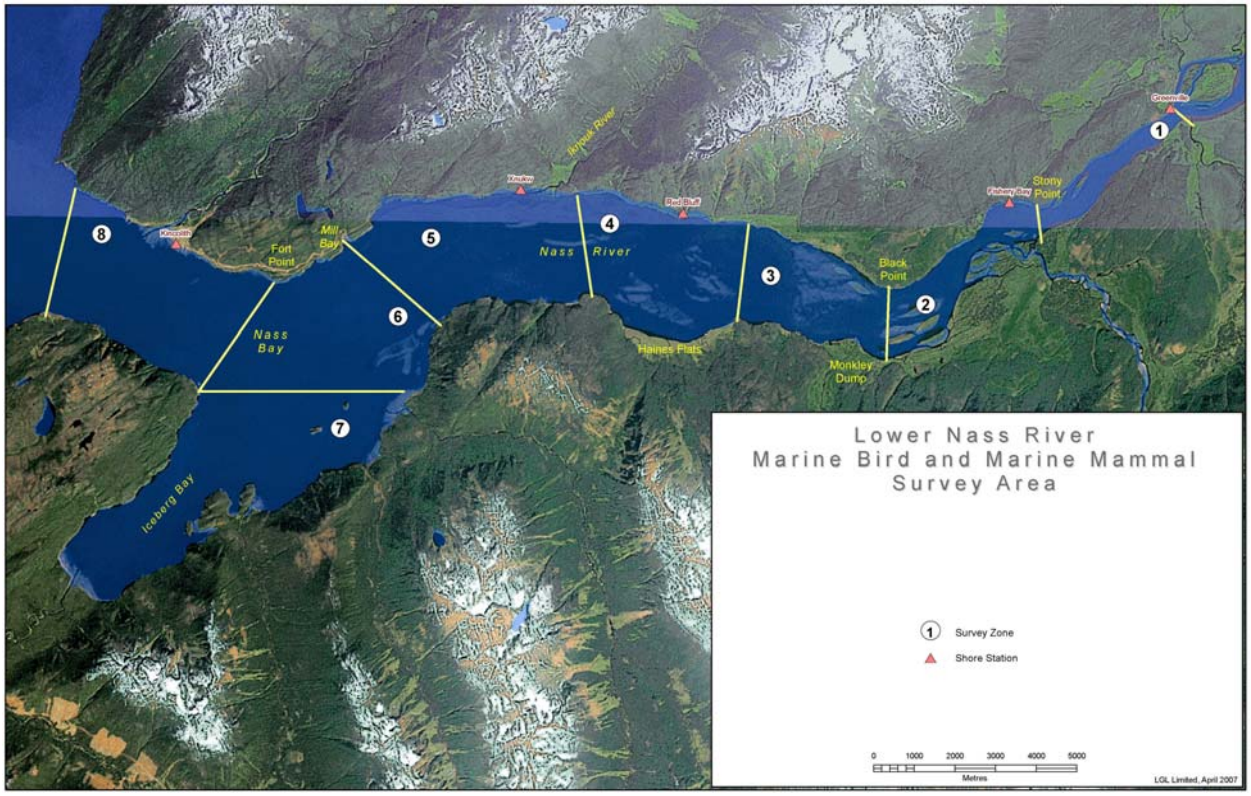


Figure 1. The boat survey zones of the lower Nass River, and the locations of the shore-based observation sites, for marine mammal and bird surveys during the eulachon run in late winter 2007.

Results

Weather

During the study period from 27 February through 27 March, the weather in the area consisted of cold temperatures (-2ºC to 5ºC) with frequent snowfall and/or rain. It snowed during 3 of the 4 boat surveys, and it rained or snowed during 7 of the 10 shore-based surveys. The Beaufort Wind Force ranged from 1 through 4 (up to 15 knots). Appendix C contains more detailed weather data for each survey day.

Eulachon Monitoring

Eulachon fishing occurred from 5–25 March, with a total of approximately 150 tons caught. The majority of fish were caught on 8–10 and 16–20 March (Fig. 2).

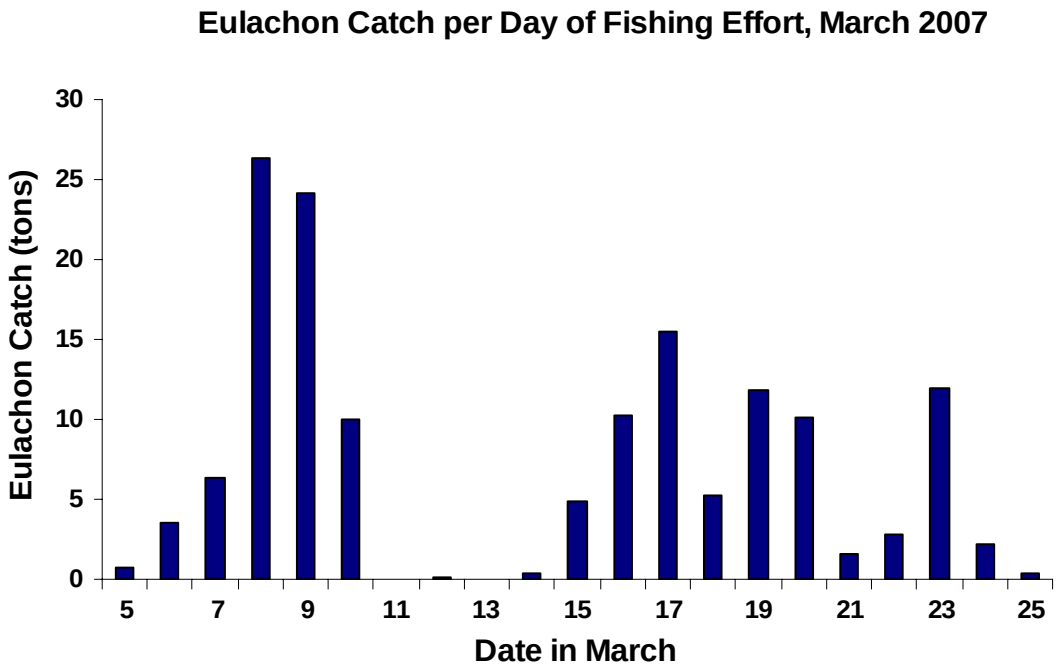


Figure 2. Eulachon catch (in tons) during each day of the 2007 harvest in the Nass River.

Marine Mammals

Aerial survey

No marine mammals were sighted during the aerial survey in that part of the Nass Marine Area surveyed outside of the lower Nass River. Two Steller sea lions (*Eumetopias jubatus*) were seen in Nass Bay (zone 6), and one harbour seal (*Phoca vitulina*) was seen in Iceberg Bay (zone 7).

Boat surveys

Three marine mammal species were seen during the boat surveys along the lower Nass River, including harbour porpoise (*Phocoena phocoena*), harbour seals, and Steller sea lions (Table 1; see Maps in Appendix E). Harbour seal was the most abundant marine mammal species (238 individuals), followed by Steller sea lion (82 individuals), and harbour porpoise (2 individuals). Harbour seals were seen in zones 2–5, but most individuals were sighted in zone 3, followed by zone 4. The majority of harbour seals (166 of 238) were observed during the last week of surveying (27 March). Steller sea lions were seen in zones 3–8, with most individuals sighted in zone 3, followed by zone 6. The greatest number of sea lions (37 of 82) was seen during the last survey (27 March). The two harbour porpoises were seen on 7 March in Iceberg Bay (zone 7).

Table 1. Marine mammal observations (number of individuals) during boat surveys in the Nass River, 27 February–27 March 2007.

	Harbour Seal				**Steller Sea Lion**				**Harbour Porpoise**				
Zone	27 Feb	7 Mar.	13 Mar.*	27 Mar.	27 Feb	7 Mar.	13 Mar.*	27 Mar.	27 Feb	7 Mar.	13 Mar.*	27 Mar.	**Total**
1	-	-	-	-	-	-	9		-	-	-	-	**9**
2	14	-	-	14	-	-	-	8	-	-	-	-	**36**
3	28	1	-	91	1	-	-	25	-	-	-	-	**146**
4	2	14	-	60	-	6	-	4	-	-	-	-	**86**
5	-	13	-	1	-	5	-	-	-	-	-	-	**19**
6	-	-	-	-	-	17	-	-	-	-	-	-	**17**
7	-	-	-	-	-	2	-	-	-	2	-	-	**4**
8	-	-	-	-	-	5	-	-	-	-	-	-	**5**
Total	**44**	**28**	**0**	**166**	**1**	**35**	**9**	**37**	**0**	**2**	**0**	**0**	**332**

*Only zone 1 was surveyed during this day.
- means not seen or data not available

Shore-based Surveys

Two marine mammal species were seen during the shore-based surveys, including harbour seal and Steller sea lion (Table 2; see Maps in Appendix E). Harbour seal was the most abundant marine mammal species sighted (833 individuals). Harbour seals were seen at 4 of the 5 locations; no harbour seals were observed at Greenville. Most harbour seals (640 individuals) were seen at Xnukw (zone 5), followed by Red Bluff (zone 4; 177 individuals). Although harbour seals were seen on all 10 survey days, the majority (722 of 833) were seen from 21–26 March. A total of 15 Steller sea lions were seen. Sea lions were sighted during five survey days at 3 of the 5 locations (Kincolith, Red Bluff, and Xnukw). The largest group (6 individuals) was seen at Kincolith on 9 March.

Table 2. Marine mammal observations (number of individuals) during shore-based surveys along the Nass River, 28 February–26 March 2007.

	Species and Observation Point										
	Harbour Seal					Steller Sea Lion					
Date 2007	Kincolith	Xnukw	Red Bluff	Fish. Bay	Greenville	Kincolith	Xnukw	Red Bluff	Fish. Bay	Greenville	Total
28 Feb.	7	31	1	-	-	-	1	-	-	-	**40**
5 March	-	-	2	1	-	-	-	-	-	-	**3**
9 March	-	3	-	-	-	6	4	-	-	-	**13**
12 March	1	-	-	-	-	-	-	2	-	-	**3**
15 March	1	-	11	1	-	-	-	1	-	-	**14**
19 March	2	48	2	-	-	-	1	-	-	-	**53**
21 March	-	292	51	-	-	-	-	-	-	-	**343**
23 March	-	1	29	-	-	-	-	-	-	-	**30**
25 March	3	231	16	-	-	-	-	-	-	-	**250**
26 March	-	34	65	-	-	-	-	-	-	-	**99**
Total	**14**	**640**	**177**	**2**	**0**	**6**	**6**	**3**	**0**	**0**	**848**

- means not seen or data not available

Marine Birds

Boat Surveys

Many species groups of birds were sighted during the surveys, most of which were gulls (family, Laridae) (Table 3; Appendix D-1; see Maps in Appendix E). Large concentrations of gulls (1000s of individuals) were seen often. At least three species of gulls were sighted, including the herring gull (*Larus argentatus*), glaucous gull (*L. hyperboreus*), and glaucous-winged gull (*L. glaucescens*). Numbers of gulls during boat surveys were only estimated during the first three surveys; no counts were made on 27 March because the observers decided to focus on counting the large number of bald eagles and other birds instead. Gulls occurred in all zones, with the greatest numbers in zones 2 and 4. The number of gulls greatly increased (from hundreds to many thousands) from the first survey (27 February) to the second survey on 7 March and remained high for the remainder of March. Herring and glaucous-winged gulls were the most abundant species. Mew gulls (*L. canus*) may have also occurred during the surveys, although they were not identified as such.

Bald eagles (*Haliaeetus leucocephalus*) were the second most abundant species group. A total of 3,332 eagles were seen during the surveys. Eagles were most often seen perched on trees along both shores of the river. They were also seen flying over the river, perched on land, logs, or sandbanks, and feeding (presumably on eulachon). At least 166 juveniles were observed. The number of eagles in the area increased markedly during the study period, from 61 individuals seen on 27 February to more than 2,000 on 27 March. Eagles were most abundant in zone 1 followed by zone 2.

Table 3. Birds seen during boat surveys in the Nass River shown by date, from 27 February–27 March 2007.

Species	Date 2007				Total
	27 February	7 March	13 March[1]	27 March[2]	
Gulls (Laridae)					
Glaucous Gull	-	45	-	-	**45**
Glaucous-Winged Gull	146	-	-	-	**146**
Herring Gull	620	4	-	-	**624**
Unidentified/Mixed Gulls*	457	25,014	3804	-	**29,275**
Ducks (Anatidae)					
Barrow's Goldeneye	-	61	-	-	**61**
Common Goldeneye	138	265	-	57	**460**
Bufflehead	23	-	-	-	**23**
Black Scoter	-	58	-	273	**331**
Unidentified Scoter	-	215	-	-	**215**
Common Merganser	1	-	-	1	**2**
Red-Breasted Merganser	1	-	-	-	**1**
Greater Scaup	1	-	-	-	**1**
Mallard	-	3	-	-	**3**
Unidentified Duck	67	-	-	-	**67**
Bald Eagle	61	835	373	2063	**3332**
Canada Goose	138	265	-	57	**460**
Trumpeter Swan	-	-	-	25	**25**
Cormorants					
Double-Crested Cormorant	-	3	-	-	**3**
Brandt's Cormorant	-	54	-	11	**65**
Unidentified Cormorant	20	-	-	-	**20**
Northwestern Crow	22	42	5	18	**87**
Common Raven	-	-	-	34	**34**
Shorebird					
Least Sandpiper	-	50	-	50	**100**
Unidentified Shorebird	20	-	-	-	**20**
Common Murre	-	32	-	-	**32**
Great Blue Heron	-	1	-	-	**1**
Unidentified Bird	3	-	-	-	**3**

- means not seen or data not available
[1] Only zone 1 surveyed on that day.
[2] Gulls not recorded on that day.
* Mixed gulls mainly consisting of herring and glaucous-winged gulls.

Ducks (family Anatidae) were the third most abundant species group sighted. At least eight different species of ducks were observed, including dabbling ducks (mallard, *Anas platyrhynchos*), pochards (greater scaup, *Aythya marila*), sea ducks (black scoter, *Melanitta nigra*; Barrow's goldeneye, *Bucephala islandica*; common goldeneye, *B. albeola*; bufflehead, *B. albeola*), and mergansers (common merganser, *Mergus merganser*; red-breasted merganser, *M. serrator*). Ducks were seen in all zones. The number of ducks increased 5 fold from 27 February to 7 March and remained high during the survey on 27 March.

Scoters, particularly black scoters, were the most abundant ducks (a total of 331 black scoters > 215 unidentified scoters). Large numbers of scoters were seen on 7 March in zone 6 and 27 March in zone 3.

The Canada goose (*Branta canadensis*) was the fourth most abundant bird seen (460 individuals). Most of the geese (401 individuals) were seen in zone 4; the survey with the greatest number of geese (265) occurred on 7 March. Twenty-five trumpeter swans (*Cygnus buccinator*) were also sighted during the survey on 27 March.

A total of 120 shorebirds were seen, most of which (100) were identified as least sandpipers (*Calidris minutilla*). Flocks of 50 birds were seen in zone 4 (near Haines Flats) on 7 and 27 March. A group of 20 unidentified shorebirds was seen in zone 4 on 27 February.

At least two different species of cormorants were seen, including the double-crested (*Phalocrocorax auritus*) and Brandt's cormorant (*P. penicillatus*). A total of 88 individuals were seen, most of which (65) were Brandt's cormorants. Cormorants were seen in zones 3–8; most cormorants (57) were seen on 7 March in zone 6.

A total of 87 northwestern crows (*Corvus caurinus*) were seen. Most crows (68 individuals) were spotted in zone 4. The survey with the greatest number of crows (42) occurred on 7 March. Ravens were only seen during the last survey on 27 March; a total of 34 individuals were seen, mostly in zone 2.

On 7 March, a small number (32) of common murres (*Uria aalge*) was seen in zone 6, and one great blue heron (*Ardea herodias*) was seen in zone 8.

Shore-based Surveys

Most of the birds sighted from shore were gulls (Table 4; Appendix D-2; see Maps). Concentrations of thousands of gulls were seen often. At least five species of gulls were spotted, including herring, glaucous, glaucous-winged, mew, and Bonaparte's gull (*L. Philadelphia*). Gulls were seen at all five locations, with the greatest number of gulls occurring at Fishery Bay (zone 2) and Red Bluff (zone 4). The number of gulls increased sharply from 494 at the beginning of the survey (27 February) to ~20,000 gulls on 25 March. Herring and glaucous-winged gulls were the most abundant species.

After gulls, ducks were the second most abundant type of bird seen, totaling 2453 individuals. At least eight different species of ducks were observed, including mallard, greater scaup, black scoter, Barrow's goldeneye, common goldeneye, bufflehead, common merganser, and red-breasted merganser. Ducks were observed at all locations. Black scoters were the most abundant ducks (886) followed by common mergansers (770). The greatest number of duck species (six) was seen at Kincolith and Xunkw.

Bald eagles were the third most abundant bird during shore-based surveys; a total of 2,182 was seen. Eagles were most often observed perched on trees along both sides of the shore (966 individuals); they were also seen on land, logs, or sandbanks (932), as well as flying overhead. Twenty-two individuals were seen feeding on fish. At least 188 juveniles were spotted. The number of eagles in the area

increased markedly during the season, from 20 individuals on 28 February to a few hundred in early March. Eagles were most abundant near Fishery Bay (zone 2), followed by Greeneville (zone 1).

Table 4. Birds seen during shore-based surveys along the Nass River shown by date, from 28 February–26 March 2007.

	Date (day, month) 2007										
Species	**28/2**	**5/3**	**9/3**	**12/3**	**15/3**	**19/3**	**21/3**	**23/3**	**25/3**	**26/3**	**Total**
Gulls											
Glaucous Gull	-	-	17	2	3	-	-	-	-	-	**22**
Glaucous-Winged Gull	30	-	-	-	-	-	-	-	-	-	**30**
Herring Gull	32	1000	43	-	-	-	-	-	-	-	**1075**
Bonaparte's Gull			1	5	-	-	-	-	-	-	**6**
Mew Gull	-	-	-	-	-	-	-	2	-	-	**2**
Unidentified/Mixed Gulls*	0.5	>7	>10	>4	>3	>12	>9	>10	>20	>16	**>97,000**
Ducks											
Barrow's Goldeneye	1	-	-	-	-	-	-	41	2	-	**44**
Common Goldeneye	1	-	80	2	15	-	-	94	-	-	**192**
Bufflehead	46	13	57	31	44	25		24	11	26	
Black Scoter	-	-	70	5	117	46	365	171	59	53	**886**
Common Merganser	-	-	-	28	37	136	152	194	8	215	**770**
Red-Breasted Merganser	-	-	-	36	12	-	-	-	2	-	**50**
Greater Scaup	-	-	-	-	-	-	-	-	-	-	
Mallard	8	-	43	44	33	1	5	11	-	4	**149**
Unidentified Duck	6	-	-	-	-	20	-	45	3	-	**74**
Bald Eagle	20	126	445	100	235	87	257	436	196	279	**2181**
Canada Goose	3	-	-	12	83	-	14	-	2	-	**114**
Trumpeter Swan	-	-	-	-	-	-	-	-	-	-	
Brandt's Cormorant	-	-	26	-	15	-	61	6	24	159	**291**
Northwestern Crow	14	-	94	112	223	79	172	59	28	25	**806**
Common Raven	6	126	15	8	13	2	4	9	9	32	**224**
Common Murre	-	-	85	50	-	-	-	-	-	44	**179**
Great Blue Heron		2	3	-	-	-	-	1	-	-	**6**
Unidentified Bird	-	-	-	-	-	11	-	-	3	-	**14**

- means not seen or data not available

* Mixed gulls mainly consisting of herring and glaucous-winged gulls; numbers given in thousands except total.

Northwestern crows were the fourth most abundant bird during surveys (totaling 806 individuals) with most individuals (718) seen at Kincolith. The greatest number (217) was seen on 15 March. A total of 224 common ravens were observed, with the majority (125) at Kincolith.

Brandt's cormorants were the fifth most abundant bird seen during shore-based surveys. A total of 291 individuals were seen between 9–26 March. Cormorants were sighted at Kincolith, Red Bluff, and Xnukw. The greatest number (101) was seen at Red Bluff on 26 March.

A total of 179 common murres were seen during surveys from 9–26 March. Most individuals (163) were seen at Kincolith; 16 were spotted at Xnukw. A total of 114 Canada geese were seen; most of the geese (83 individuals) were seen at Xnukw on 15 March. Geese were also observed at Greenville. Six great blue herons were spotted at Kincolith from 5–23 March.

Discussion and Summary

Boat, aerial, and shore-based surveys were done in portions of the Nass Marine Area in late winter 2007 to examine the distribution and abundance of marine mammals and marine-associated birds at the time of the annual eulachon spawning run. The single aerial survey did not reveal the presence of any marine mammals in that part of the Nass Marine Area outside of the lower Nass River. Although the boat surveys were planned to determine the occurrence and distribution of marine mammals in the lower Nass River, not all zones could be covered during each boat survey due to poor weather conditions. Subsequently, harbour seals were observed more frequently during the shore-based surveys than boat surveys. In contrast, more Steller sea lions, as well as harbour porpoise, were seen during boat surveys than from shore.

The boat surveys revealed a high abundance of harbour seals just downriver (zones 3 and 4) from Fishery Bay, where most eulachon is harvested. The highest numbers of harbour seals seen from shore were observed a little farther downriver at Xnukw (zone 5) and Red Bluff (zone 4). However, zone 3 was not surveyed from shore due to limited access from the road. A drive along the shore from Kincolith to Greenville on 18 March also revealed a large number (40) of harbour seals between Black Point and Xnukw (zones 3–5). Zones 3 and 4 also contained the largest amount of sand bars exposed during low tides for haul out. Approximately one third of the seals observed from shore during the study were hauled out. Harbour seals were seen in the area from the end of February through March, with the greatest number of sightings from 21–27 March. This increase in the number of sightings did not appear to be related to a peak in eulachon catch, but rather the end of eulachon harvesting activities.

The greatest numbers of Steller sea lions were seen in zone 3, followed by zone 6. Although some sea lions were spotted in zone 2 (Fishery Bay), it is likely that some animals may avoid this area, because they are hunted there. During the study period, several (at least four) sea lions were taken in Fishery Bay; hunting effort typically increases after the eulachon harvest. Sea lions were seen in the area from the end of February through March, but most individuals were seen on 7 and 27 March, which coincided with the beginning and end of the eulachon run, respectively (as determined by catch). From the data collected, it would appear that Steller sea lions are more easily surveyed by boat than from shore.

Bird surveys were done by boat as well as from shore. Gulls were the most abundant type of bird in the Nass Area during the study period. Most of the gulls were identified as herring and glaucous-winged gulls, although a large number were also likely to have been mew gulls and Bonaparte's gulls (see Demarchi 1997). The greatest numbers of gulls were seen in Fishery Bay, where most eulachon harvesting takes place. The number of gulls increased greatly from late February to early March, with the onset of the eulachon run. More than 20,000 gulls were counted in the area during a single day of the eulachon run.

Bald eagles were easily spotted from the boat as well as from shore, although numbers seen during boat surveys were greater. This was likely because more of the shoreline could be covered during the boat survey than from the observation points during shore-based surveys. During the study period, several thousand bald eagle sightings were made. Bald eagles were most often seen perched in trees on both sides of the river. Some individuals were seen feeding on fish, which were presumably eulachon. Demarchi (1997) also noted frequent sightings of bald eagles perched in trees in the study area in spring. Eagles were most abundant in zones 1 and 2. Their numbers increased dramatically from the end of February to early March, coinciding with the start of the eulachon run, and remained high throughout March.

At least eight different species of ducks were seen in the Nass Area. The number of ducks increased dramatically from the end of February to early March, with the onset of the eulachon run. Black scoters were the most abundant ducks in the area and were easily seen from the boat as well as from shore. They were commonly sighted in the survey area, except for zone 1 (Greenville), 4 (Red Bluff), and 7 (Iceberg Bay). Although no surf scoters were seen during the surveys, a group of several hundred was seen from the government dock in Kincolith on 18 March. Common mergansers were the second most abundant duck, with most sightings made from shore and only a few from boat. The greatest number was seen in zone 5, followed by zone 4.

Several additional species of birds were observed in the area during springtime surveys in April and May 1997 (Demarchi 1997). In particular, grebes and loons were seen during spring surveys, but were not sighted during winter surveys at the time of the eulachon run. In addition, several other species of dabbling and diving ducks were sighted during spring surveys that were not seen during the winter survey (see Demarchi 1997). However, during the winter survey, large numbers of black scoters were seen, which were not observed during spring surveys. In contrast, Demarchi (1997) noted a high abundance of surf scoters in the area; these ducks were not seen during the winter surveys, but were sighted opportunistically in Kincolith.

From the surveys that took place in the Nass area in late winter of 2007, it is evident that the increase in numbers of birds, seals, and sea lions in the lower Nass River coincided with the beginning of the eulachon run around ~5 March. However, according to the fishermen, even though the 2007 harvest of eulachon was successful, it was not quite as plentiful as in some previous years.

Shore-based surveys are an effective method for observing birds and harbor seals in the lower Nass River. However, a survey site should be added in zone 3 as well as zone 6 for more complete coverage of the area. Since shore-based observations can be made during most (if not all) weather conditions, trends in numbers of animals over time can more readily be interpreted from these data than those obtained during boat surveys. Therefore, future surveys during the eulachon run should focus on shore-based observations two to three times per week, with a single boat survey in the middle or near the end of the run. To examine the composition and distribution of species in the Nass River throughout the year, shore-

based surveys are recommended once per month starting at the end of the eulachon harvest and continuing through the fall.

Although the boat surveys were also effective at documenting the distribution of birds and seals in the area, boat operations were largely dependent on the weather and tide height. For example, zone 1 was surveyed most often (4 times), zones 2–5 were surveyed three times, zone 6 was surveyed twice, and zones 7–8 were surveyed only once. Nonetheless, boat surveys may be more appropriate when surveying for Steller sea lions, cetaceans, and perhaps bald eagles in the lower Nass River and should be conducted on an opportunistic basis as funding permits. For example, boat surveys could take place once in the late winter during the eulachon run, and once a month from spring through fall to examine the distribution of marine mammals and bald eagles at other times of the year.

Aerial surveys do not seem to be necessary to examine the occurrence and distribution of marine mammals or birds in the lower Nass River as this can be done by boat or from shore. Even though no marine mammals were seen outside of the Nass River during the aerial survey, a group of killer whales was reported outside of Kincolith a week or two before the survey. However, it is clear that the concentrations of seals, sea lions, and birds that are associated with the eulachon run occur within the lower Nass River itself. Periodic aerial surveys of the entire Nass Marine Area should be conducted to provide information on the distribution of marine mammals throughout the area during other times of the year (e.g., during the summer and fall) when migrating whales are expected to occur there.

Future surveys of marine mammals and birds in the Nass River in late winter will increase our understanding of annual variations in the occurrence and abundance of these animals in association with the annual eulachon run. Additional surveys conducted monthly would provide valuable information on species composition and distribution at other times of the year. The information obtained from ongoing surveys will be useful in planning and making decisions on future developments in the Nass Marine Area.

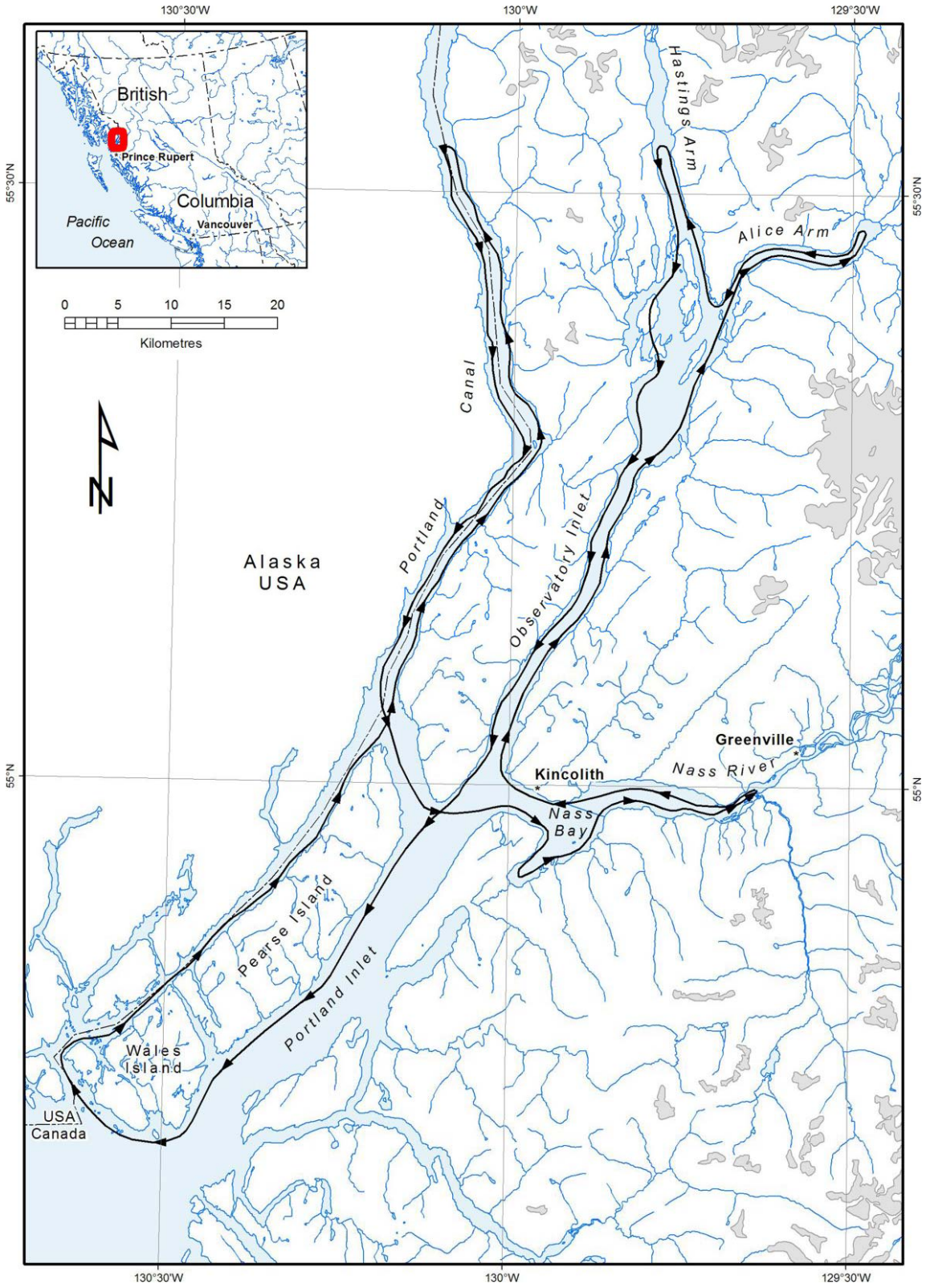
Acknowledgements

A special thanks to Blair Stewart, Cheryl Stephens, Tanya Clayton, and Terry Morven (of Nisga'a Fisheries) for administrative and logistical support. Field work was carried out by the enthusiastic observer team consisting of April Angus, Tracey McKay, and Meike Holst. Craig McKay and Ben Gonu Sr. operated the boat. The floatplane used for the aerial survey was chartered from North Pacific Seaplanes. Richard Alexander, Bob Bocking, and Mike Demarchi of LGL provided technical and logistical support. Robin Tamasi of LGL produced the maps, and Mike Demarchi and Bob Bocking reviewed a draft of the report.

Literature Cited

Demarchi, M.W. 1997. Wildlife and habitat impact assessment Greenville to Kincolith highway project. Report prepared by LGL Limited, Sidney, BC, for BC Ministry of Transportation and Highways, Victoria, BC. 69 p.

Appendix A Route of aerial survey in the wider Nass Marine Area, 18 March 2007



Appendix B Data sheet used to record observations during the boat and shore-based surveys during the late spring in 2007

PAGE # ____

	Day	Month	Year
DATE			
LOCATION/ZONE			

	Hrs	Min	Sec
START TIME			
END TIME			

	Temp (°C)	Wind (km/h)	Wind Force	CC (%)	Precip.	Tide
WEATHER						

OBSERVER(S) ____ Circle: BOAT / LAND PROJECT # ____

Species	Number	Behaviour	Direction	Age Class & Sex								
				Adult			Juvenile			Unknown		
				M	F	U	M	F	U	M	F	U

COMMENTS: ____

Appendix C Weather conditions during the boat and shore-based surveys during late spring 2007

Date in 2007	Temperature (°C)	Beaufort Wind Force	Cloud Cover (%)	Precipitation	Tide
27 Feb.	-2	1 - 3	100	Snow	Half / High
28 Feb.	0	1	20	None	Half / High
5 March	3	1	20 - 100	Rain	Half / Low
7 March	3 - 5	1	10	None	Half / High
9 March	1	1	20	None	Half / Low
12 March	1	1	90 - 100	snow	Half / High
13 March	-1	2	100	Snow	Half / High
15 March	1	1	50 - 70	Rain / Snow	Half Tide
19 March	-1	4	70 - 100	Snow	Half / Low
21 March	1	1	70	Rain / Snow	Half / Low
23 March	2	1 - 2	50 - 70	Rain	Half / Low
25 March	2	1	20	Rain	Half / Low
26 March	3	1 - 2	20	None	Half / Low
27 March	1	4	20	Snow	Half / High

Appendix D-1 Birds seen during boat surveys in the 8 zones of the Nass River, 27 February–27 March 2007

	Zone*								
Species	**1 (x4)**	**2 (x3)**	**3 (x3)**	**4 (x3)**	**5 (x3)**	**6 (x2)**	**7 (x1)**	**8 (x1)**	**Total**
Gulls (Laridae)	6816	10,014	300	10,624	773	1440	123	-	**30,090**
Ducks (Anatidae)	7	5	309	51	12	277	57	23	**741**
Bald Eagle	1802	826	529	114	25	7	25	4	**3332**
Canada Goose	-	7	22	401	-	-	30	-	**460**
Trumpeter Swan	-	23	-	2	-	-	-	-	**25**
Cormorants	-	-	20	3	3	50	-	12	**88**
Northwestern Crow	19	-	-	-	-	-	-	68	**87**
Common Raven	1	33	-	-	-	-	-	-	**34**
Shorebird	-	-	-	120	-	-	-	-	**120**
Common Murre	-	-	-	-	-	32	-	-	**32**
Great Blue Heron	-	-	-	-	-	-	-	1	**1**
Unidentified Bird	-	-	3	-	-	-	-	-	**3**

- means not seen or data not available

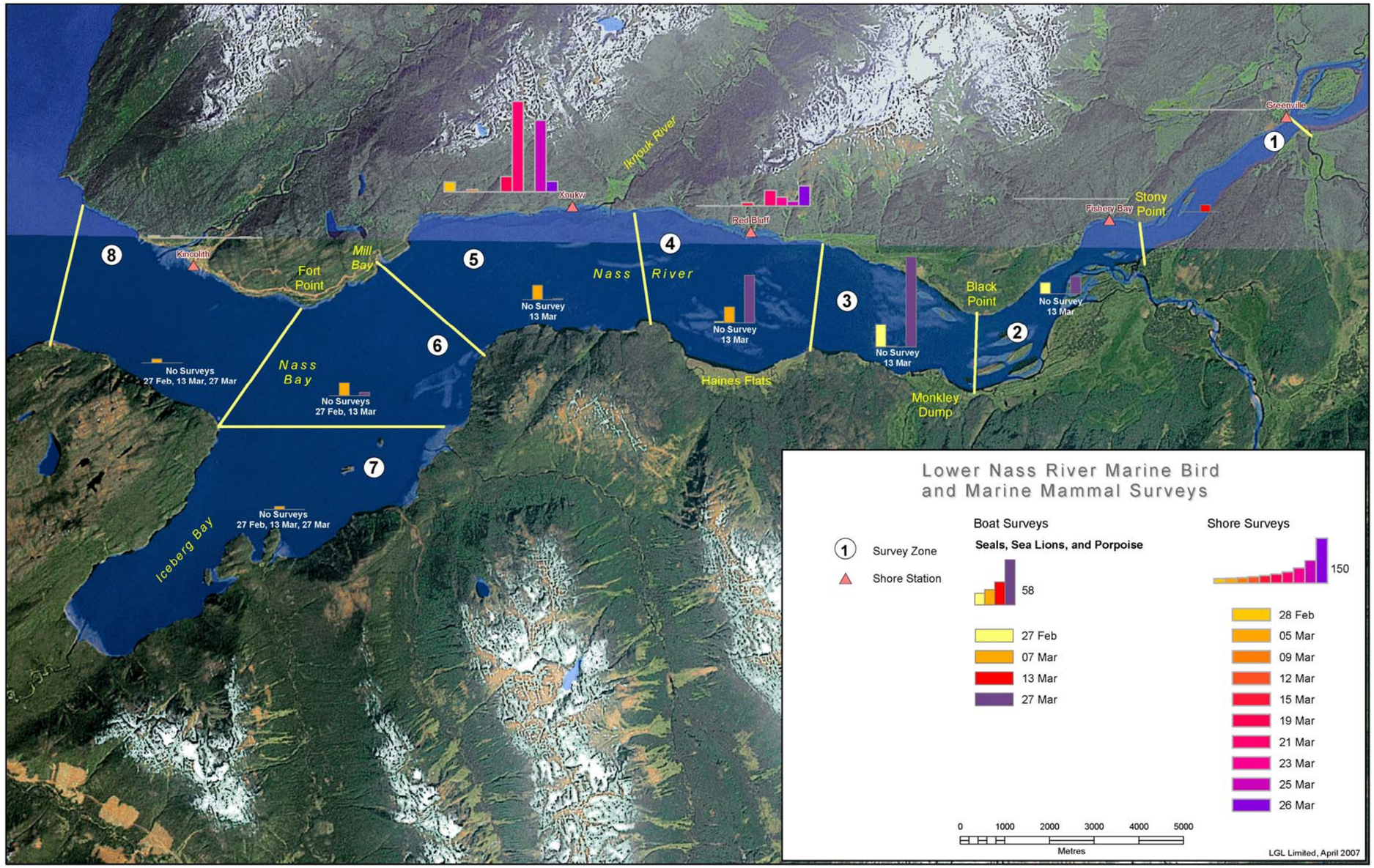
* Data were not collected in all zones during each survey day; number of time a zone was surveyed is shown in brackets below zone number.

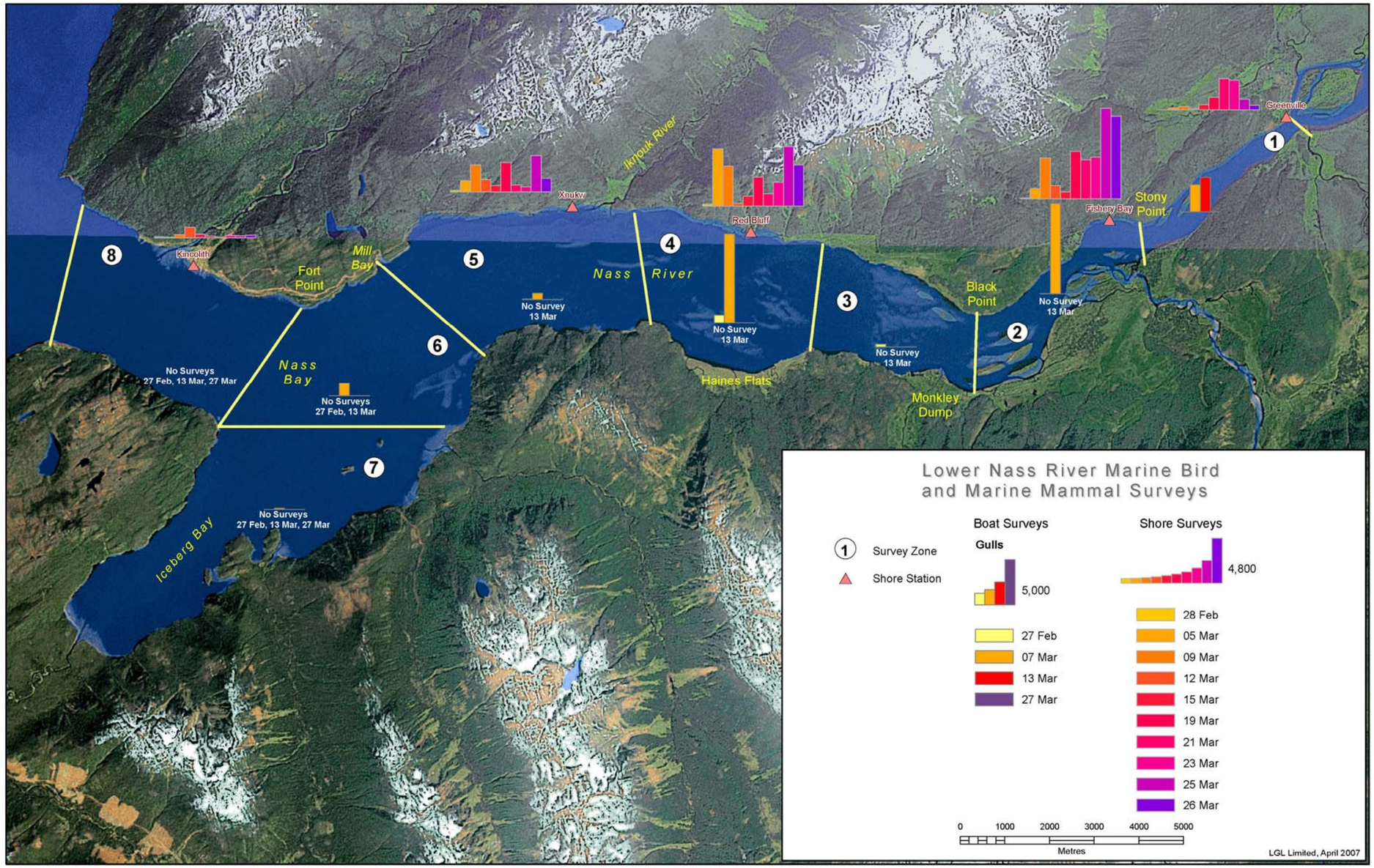
Appendix D-2 Birds seen during shore-based surveys along the Nass River by observation site, from 28 February–26 March 2007

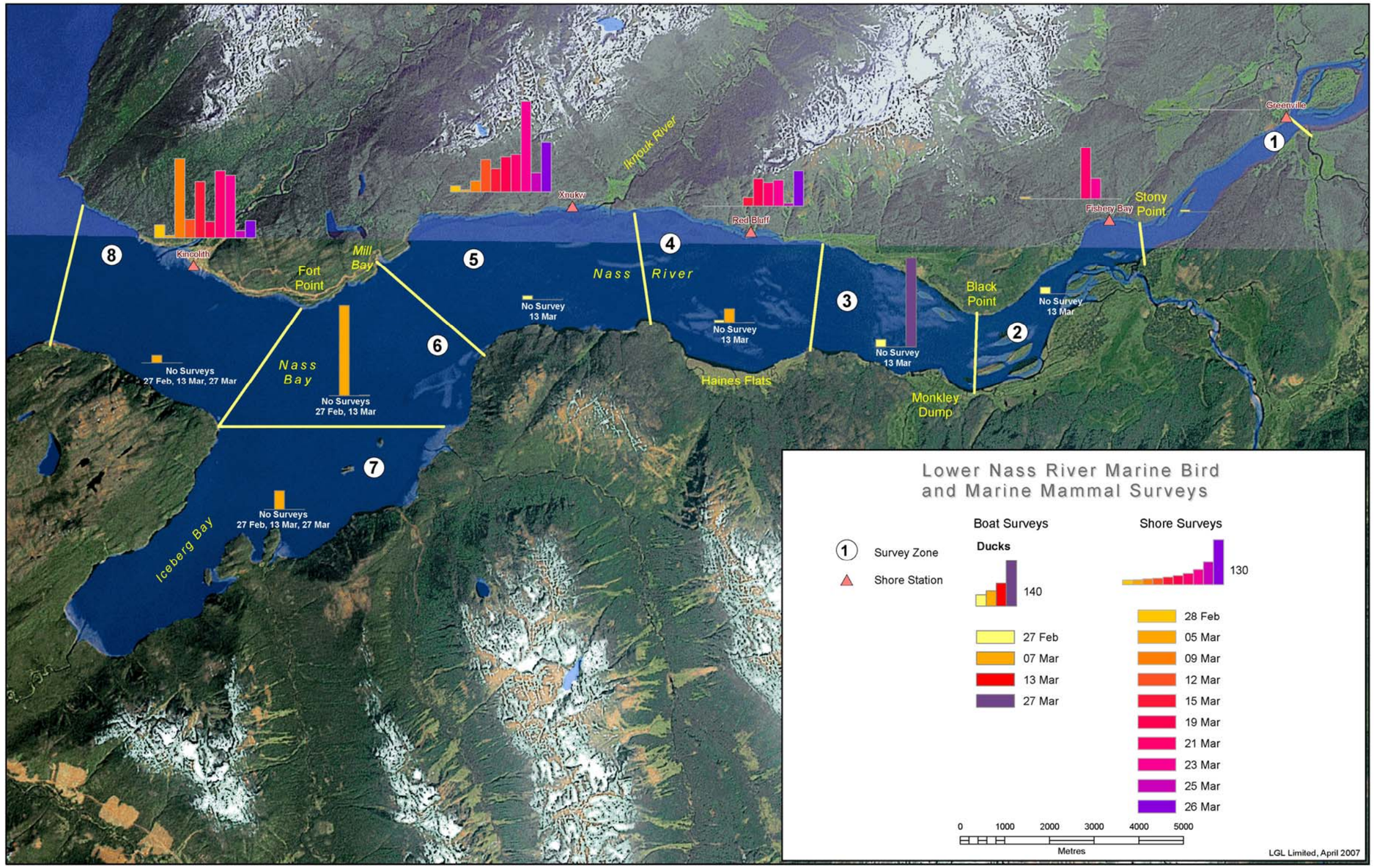
	Observation Site					
Species	**Kincolith**	**Xnukw**	**Red Bluff**	**Fishery Bay**	**Greenville**	**Total**
Gulls (Laridae)	2851	15,564	28,200	39,366	10,587	**97,703**
Ducks (Anatidae)	30	573	228	-	-	**831**
Bald Eagle	44	75	163	1142	757	**2181**
Canada Goose	-	95	-	-	19	**114**
Cormorants	100	59	132	-	-	**291**
Northwestern Crow	718	15	12	7	54	**806**
Common Raven	125	4	14	62	19	**224**
Common Murre	163	16	-	-	-	**179**
Great Blue Heron	6	-	-	-	-	**6**
Unidentified Bird	3	11	-	-	-	**14**

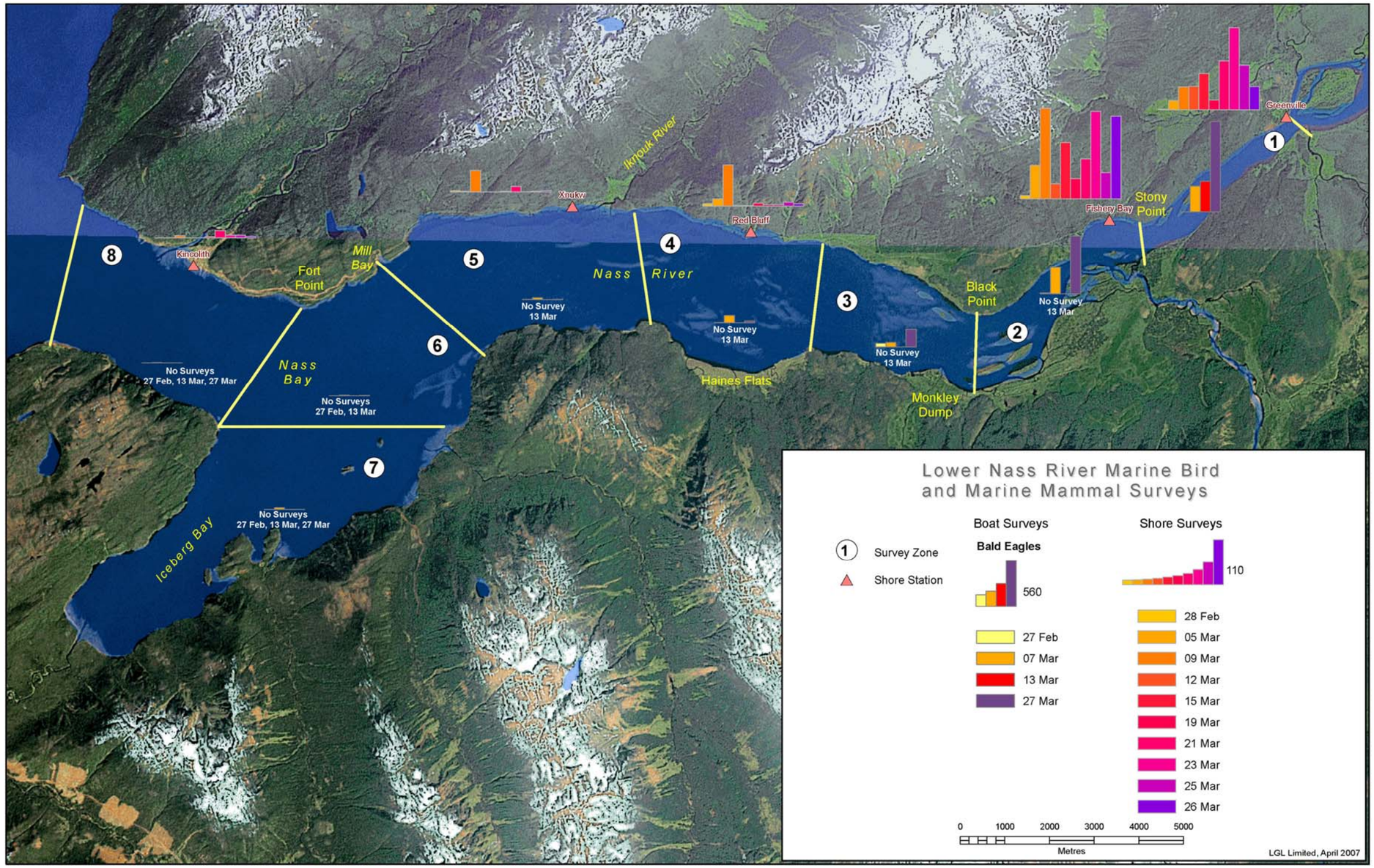
- means not seen or data not available

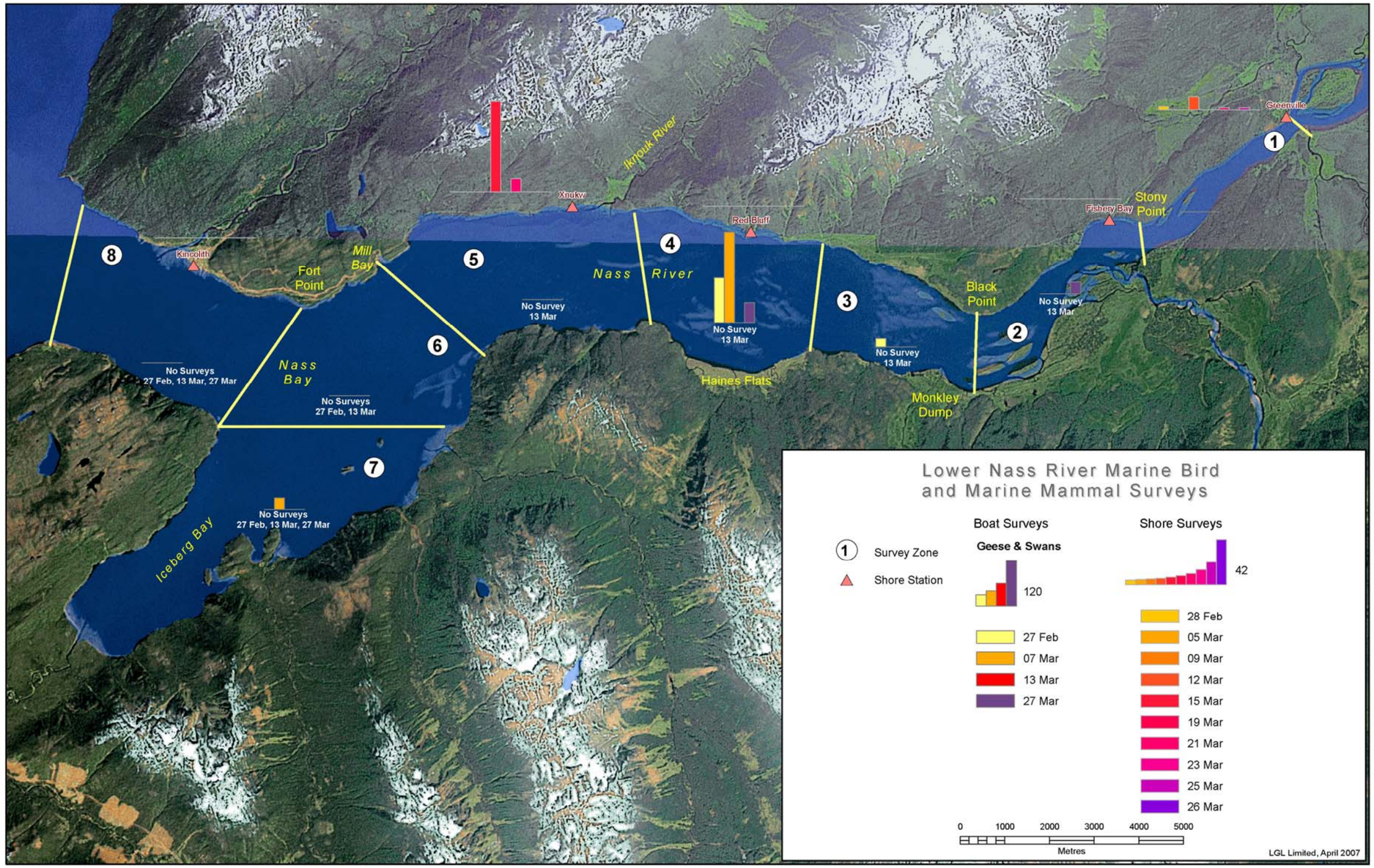
Appendix E Maps showing results of marine mammal and bird surveys along the lower Nass River, 27 February–27 March 2007

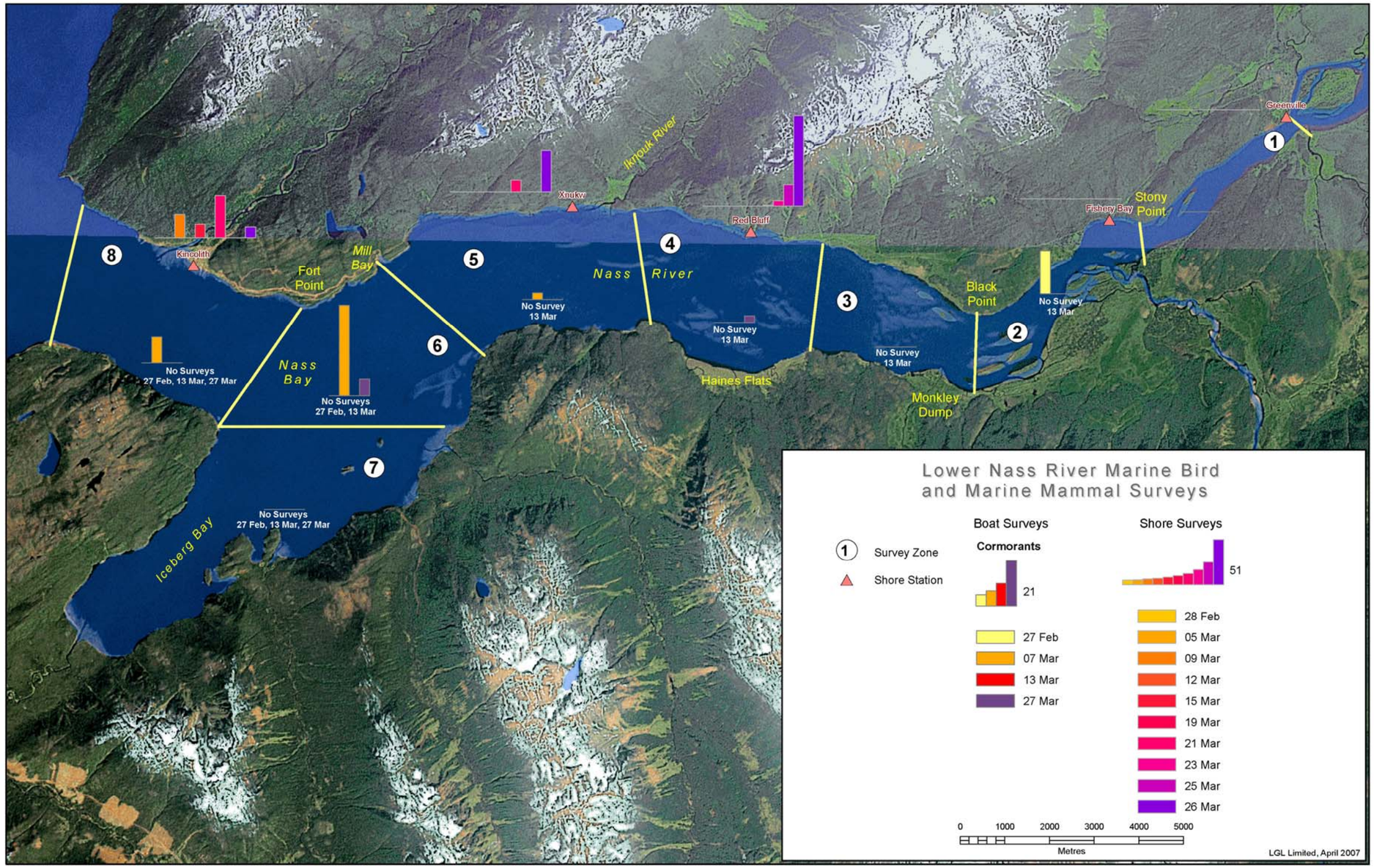

Greenville
1
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
8
Fort Point
Mill Bay
5
4
Nass River
No Survey 13 Mar
No Survey 13 Mar
3
Black Point
No Survey 13 Mar
No Survey 13 Mar
2
6
Nass Bay
No Surveys 27 Feb, 13 Mar, 27 Mar
No Surveys 27 Feb, 13 Mar
Haines Flats
Monkley Dump
7
No Surveys 27 Feb, 13 Mar, 27 Mar
Iceberg Bay
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
1 Survey Zone
Shore Station
Seals, Sea Lions, and Porpoise
58
150
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007

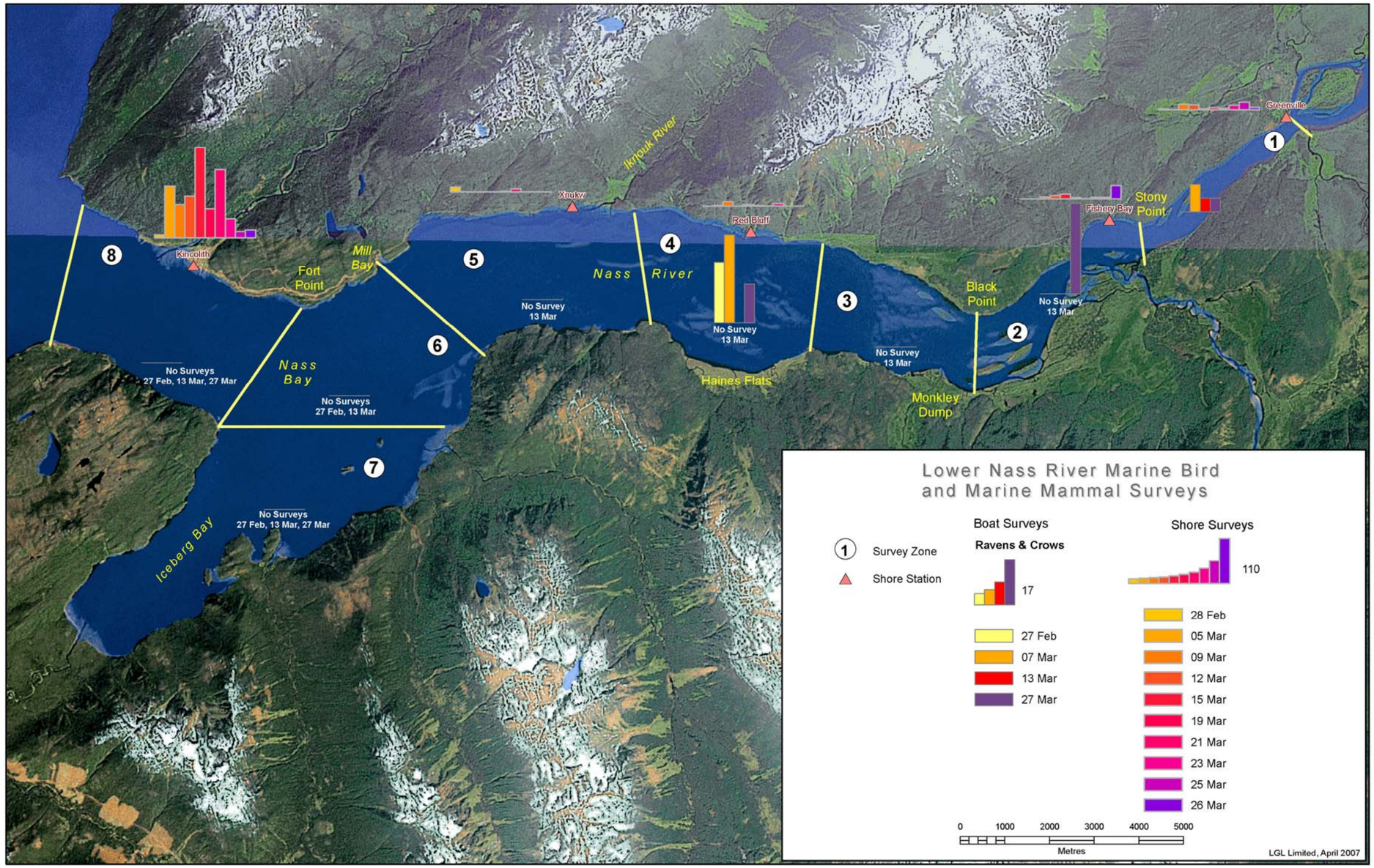

Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
Nass Bay
Haines Flats
Monkley Dump
Iceberg Bay
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
No Surveys 27 Feb, 13 Mar
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Gulls
5,000
4,800
Survey Zone
Shore Station
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007

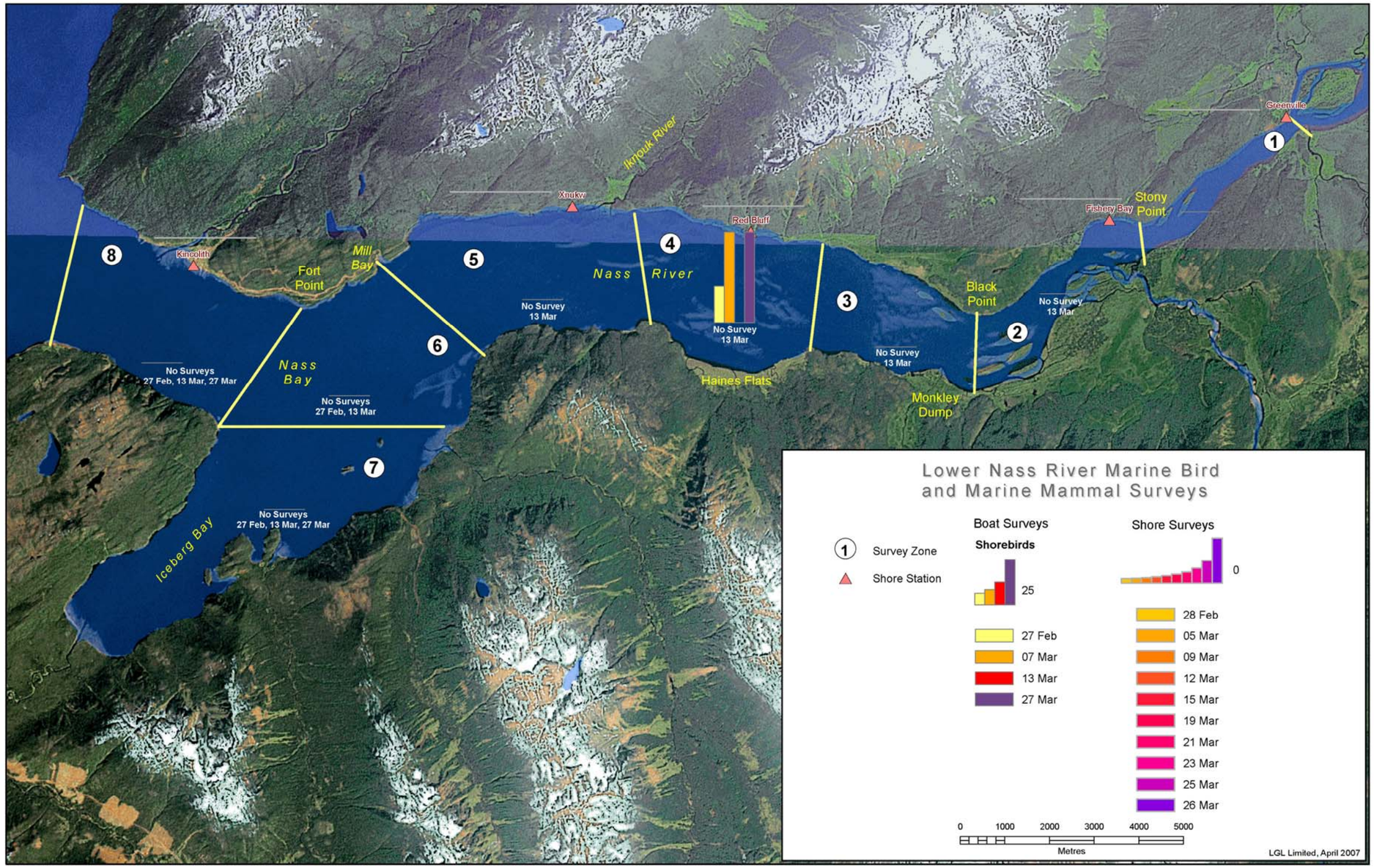

Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Fort Point
Mill Bay
Nass River
Black Point
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Nass Bay
No Surveys 27 Feb, 13 Mar
Haines Flats
Monkley Dump
No Surveys 27 Feb, 13 Mar, 27 Mar
Iceberg Bay
1
2
3
4
5
6
7
8
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Ducks
140
130
Survey Zone
Shore Station
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007

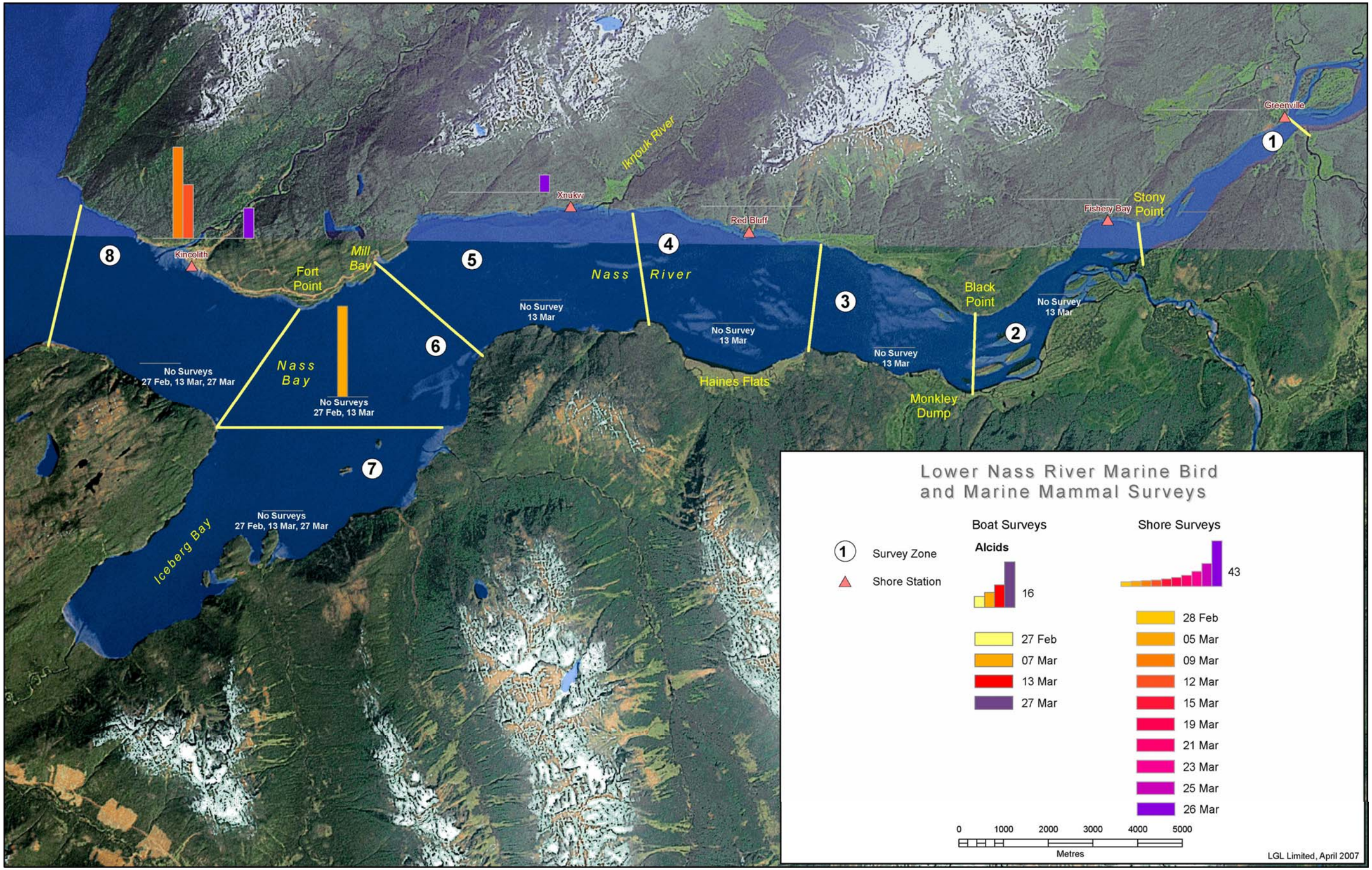

Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
Haines Flats
Monkley Dump
Nass Bay
Iceberg Bay
1
2
3
4
5
6
7
8
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
No Surveys 27 Feb, 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Survey Zone
Shore Station
Bald Eagles
560
110
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007

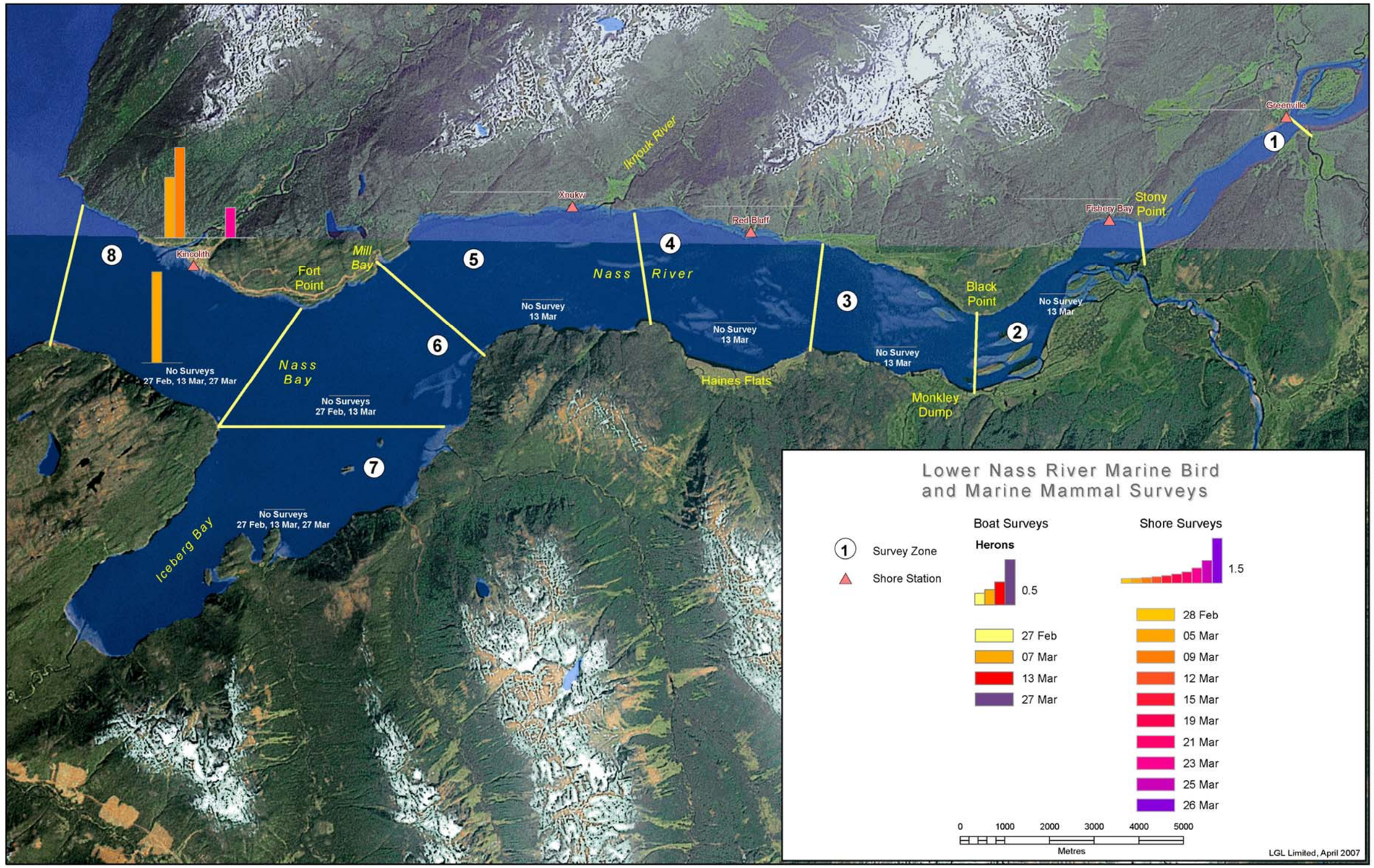

Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
Haines Flats
Monkley Dump
Nass Bay
Iceberg Bay
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
No Surveys 27 Feb, 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Survey Zone
Shore Station
Geese & Swans
120
42
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007

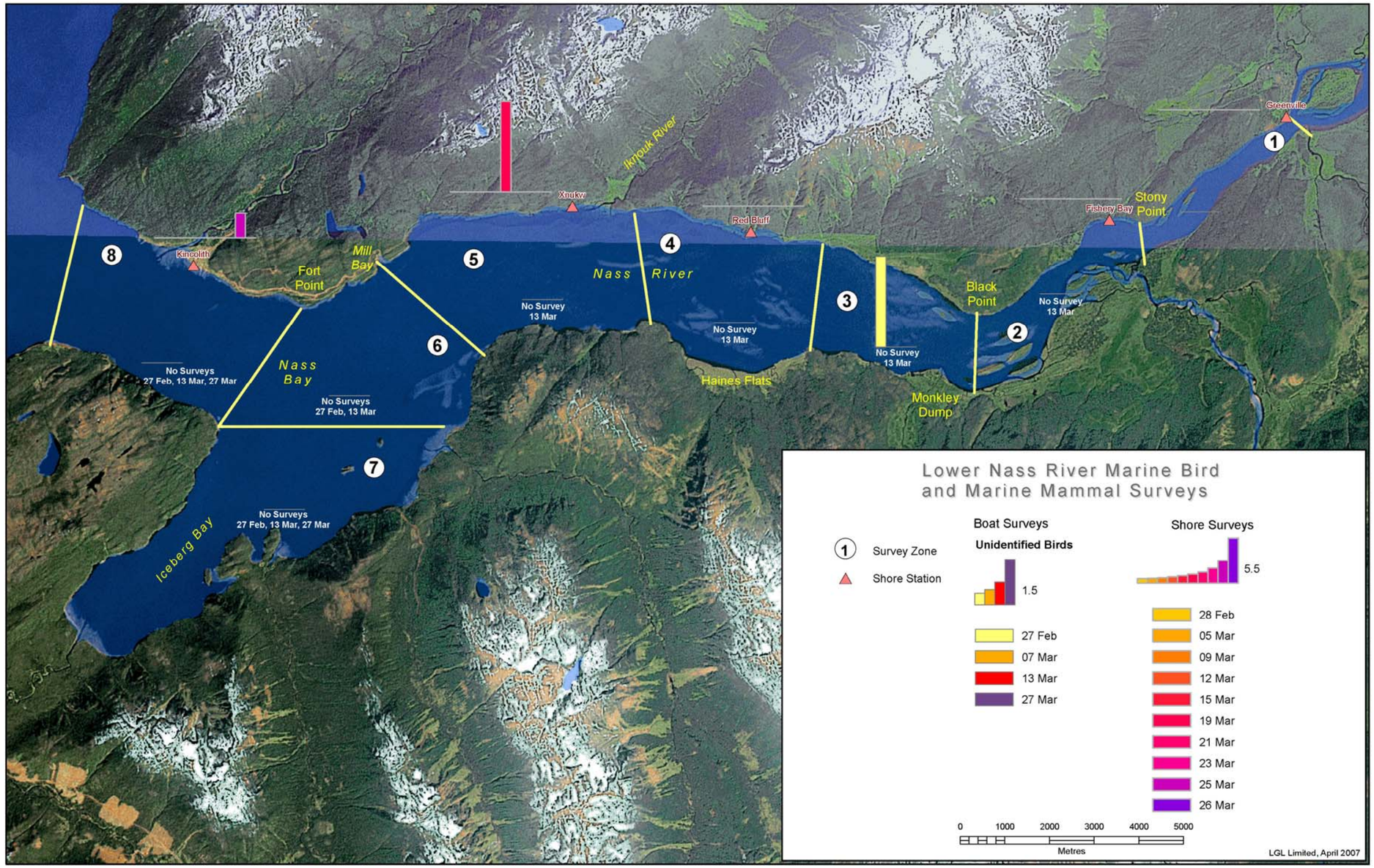

Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Fort Point
Mill Bay
Nass River
Black Point
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Nass Bay
No Surveys 27 Feb, 13 Mar
Haines Flats
Monkley Dump
No Surveys 27 Feb, 13 Mar, 27 Mar
Iceberg Bay
1
2
3
4
5
6
7
8
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Survey Zone
Shore Station
Cormorants
21
51
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007


Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
Haines Flats
Monkley Dump
Nass Bay
Iceberg Bay
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
No Surveys 27 Feb, 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Ravens & Crows
17
Survey Zone
Shore Station
Shore Surveys
110
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007


Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Nass Bay
No Surveys 27 Feb, 13 Mar
Haines Flats
Monkley Dump
No Surveys 27 Feb, 13 Mar, 27 Mar
Iceberg Bay
1
2
3
4
5
6
7
8
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shorebirds
25
Shore Surveys
0
Survey Zone
Shore Station
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007


Greenville
Ikrouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Fort Point
Mill Bay
Nass River
Black Point
Nass Bay
Haines Flats
Monkley Dump
Iceberg Bay
1
2
3
4
5
6
7
8
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
No Surveys 27 Feb, 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Survey Zone
Shore Station
Alcids
16
43
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007


Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Survey 13 Mar
No Surveys 27 Feb, 13 Mar, 27 Mar
Nass Bay
No Surveys 27 Feb, 13 Mar
Haines Flats
Monkley Dump
No Surveys 27 Feb, 13 Mar, 27 Mar
Iceberg Bay
1
2
3
4
5
6
7
8
Lower Nass River Marine Bird and Marine Mammal Surveys
Boat Surveys
Shore Surveys
Herons
0.5
1.5
Survey Zone
Shore Station
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007


Greenville
Ikpouk River
Xnukw
Red Bluff
Fishery Bay
Stony Point
Kincolith
Mill Bay
Fort Point
Nass River
Black Point
No Survey
13 Mar
No Surveys
27 Feb, 13 Mar, 27 Mar
Nass Bay
No Surveys
27 Feb, 13 Mar
Haines Flats
Monkley Dump
Iceberg Bay
No Surveys
27 Feb, 13 Mar, 27 Mar
Lower Nass River Marine Bird
and Marine Mammal Surveys
Boat Surveys
Unidentified Birds
1.5
Survey Zone
Shore Station
Shore Surveys
5.5
27 Feb
07 Mar
13 Mar
27 Mar
28 Feb
05 Mar
09 Mar
12 Mar
15 Mar
19 Mar
21 Mar
23 Mar
25 Mar
26 Mar
0 1000 2000 3000 4000 5000
Metres
LGL Limited, April 2007