

**Department of Conservation CSL 2001/2002 Contract:
Autopsy of New Zealand sea lions incidentally caught in commercial
fisheries.**

Interim Report 6 May 2002

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Specimens

Full necropsies have been carried out on ten New Zealand sea lions (*Phocarctos hookeri*) and one New Zealand fur seal (*Arctocephalus forsteri*) ejected through the Sea Lion Exclusion Device (SLED) into a cover net. A further four sea lions have been received but have not yet been necropsied. This is an interim report summarising the gross observations on all the animals examined to date.

Preliminary results

Table 1 Information contained in this table includes capture details from the observer's record, the species and sex of each animal. Each specimen was given a Massey code and a pathology code.

Table 2 Contains morphometric data on the sea lions including weight, standard length (Std Lt), girth behind pectoral flipper (Gt Pec) and blubber depth at mid-sternum.

Table 3 Contains data on the full and empty stomach weight, and gross identification of stomach contents.

Table 5 Morphometric data on the female reproductive tract. Histological examination of the ovaries is pending.

Table 6 Contains morphometric data on the male reproductive tract. Histological examination of the gonads is pending.

Table 7 Summary of gross pathology of all dolphins. Histological examination of tissues is pending.

Gross Pathology

SB02-07Ph (CSL 1224)

External: No visible lesions.

Internal: There was evidence of mild blunt trauma with haemorrhage of the muscle along the caudo-ventral sternum around the ziphoid cartilage (23 x 8 cm), and the dorsal aspect of the shoulder (12 x 8 cm). The animal was in

excellent body condition with good fat reserves in the blubber and around the heart and kidneys.

Alimentary: There was regurgitated food in the mouth and distal nasal passages. The stomach was half-full, with contents consisting of fish otoliths, lenses and bones, whole squid, squid beaks, lenses and parts.

Respiratory: The pulmonary parenchyma had moderate diffuse congestion and oedema. There was a small volume of fluid in the airways.

Cardiovascular: No visible gross lesions.

Urogenital: No visible lesions.

Diagnosis: Consistent with mild trauma, asphyxiation.

SB02-08Ph (CSL 1012)

External: No visible lesions.

Internal: There was evidence of mild blunt trauma with erythema of the blubber and haemorrhage of the superficial muscle over the right shoulder (17 x 16 cm). The animal was in good body condition with good fat reserves in the blubber, around the heart and reniculi of the kidneys, and in the peritoneal wall.

Alimentary: The stomach was half full with contents consisting of two whole squid, squid beaks and lenses; fish bones, lenses, otoliths and pieces; salps and amphipods.

Respiratory: Bloody fluid was observed in the trachea and bronchi. The pulmonary parenchyma had severe diffuse congestion, interlobular oedema and alveolar emphysema. The cranial mediastinal lymph node was enlarged and active with large follicles apparent in the cortex.

Cardiovascular: No visible lesions.

Urogenital: No visible lesions.

Diagnosis: Asphyxiation and mild trauma.

SB02-09Ph (CSL 1013)

External: No visible lesions.

Internal: There was evidence of moderate to severe blunt trauma with erythema of the blubber and deep haemorrhage of the muscle along the ventral sternum and left lateral thorax. There was also severe blunt trauma along the dorsal surface of the cranium along the cranial crest. There was free blood (approx 1 litre) in the abdominal cavity. The animal was in good body condition with good internal fat reserves and deep blubber.

Alimentary: The stomach was mostly empty with contents consisting of one small whole fish, and some fish otoliths.

Respiratory: Bloody fluid was observed in the lumen of the trachea, bronchi and bronchioles. The tracheal mucosa was congested. The pulmonary parenchyma had severe diffuse congestion and oedema.

Cardiovascular: No visible lesions.

Urogenital: There was subcapsular haemorrhage over the caudal half of both kidneys.

Diagnosis: Asphyxiation and moderate to severe trauma to head, thorax and abdomen.

SB02-10Ph (CSL 1014)

External: There was a 10 mm perforation through the left side of the neck extending into the jugular vein. There was haemorrhage in the blubber and cervical

muscle for 60mm surrounding the perforation suggesting that it had occurred pre-mortem.

- Internal: There was moderate to severe blunt trauma with erythema of the blubber and deep haemorrhage of the muscle along the ventral sternum and lateral thorax. There was also severe blunt trauma over the cranium extending over the dorsal surface from the first cervical vertebra (C₁) to the snout, and laterally over the zygomatic arches. There was free blood in the thoracic and abdominal cavities. The animal was in good body condition with good internal fat reserves and a deep blubber layer.
- Alimentary: There was a whole squid in the thoracic oesophagus. The stomach was full with contents consisting of 16 whole squid, squid beaks, lenses, and pieces, and fish otoliths.
- Respiratory: Bloody fluid and stable froth was observed in the lumen of the trachea and bronchi. The tracheal and bronchial mucosae were congested. The pulmonary parenchyma had multi-focal bullous emphysema and diffuse interlobular oedema that was most severe at the periphery of the lung lobes.
- Cardiovascular: No visible lesions.
- Urogenital: There was focal subcapsular haemorrhage on both kidneys.
- Diagnosis: Asphyxiation and moderate to severe trauma to head, thorax and abdomen.

SB02-11Ph (CSL 1342)

- External: The second inter-phalangeal joint of the fifth toe of the right pelvic flipper was ankylosed and associated with an external callus on the skin. There was faecal material staining the perianal hair.
- Internal: There was evidence of mild contusion along the ventral sternum consisting of erythema of blubber and haemorrhage of the muscle, extending from the manubrium to the xiphoid cartilage. The animal was in excellent body condition, with good fat reserves in the blubber, peritoneum, in the pericardium and along the coronary veins, and around the reniculi of the kidneys.
- Alimentary: The stomach was mostly empty with one whole squid, some squid pieces, beaks, lenses, and three fish otoliths.
- Respiratory: There was white froth in the buccal cavity and trachea, and blood stained froth in the bronchi and bronchioles. The pulmonary parenchyma had severe diffuse congestion and oedema. There was diffuse bullous emphysema with occasional lobular emphysema in the periphery of both lung lobes.
- Cardiovascular: No visible lesions.
- Urogenital: The right kidney had subcapsular haemorrhage along the dorsal surface.
- Diagnosis: Asphyxiation and mild to moderate trauma to the thorax and abdomen.

SB02-12Ph (CSL 0702)

- External: No visible lesions.
- Internal: There was severe cranial trauma characterised by retro-bulbar and intra-ocular haemorrhage of the right eye and contusion along the dorsal surface of the skull extending caudally from the interocular area to the occipital bones, and laterally to the ear. The right side of the snout had subcutaneous haemorrhage and there was haemorrhage in the nasal sinuses. In addition, there was also evidence of mild blunt trauma with erythema of the blubber and haemorrhage of the superficial pectoral muscle along the ventral

sternum extending at intervals from the manubrium to the xiphoid cartilage. There was free blood (approximately 1.5 litres) in the abdomen. The animal was in excellent body condition with good fat reserves in the blubber, peritoneum, pericardium and epicardium of the heart, and between the reniculi of the kidneys.

- Alimentary: One whole fish was lodged in the pharyngeal cavity. The stomach was empty of digestible material, with contents consisting of fish bones and otoliths.
- Respiratory: Bloody fluid was observed in the trachea, bronchi and bronchioles. The pulmonary parenchyma had severe diffuse congestion and oedema. There was scattered sub-pleural bullous emphysema over all lung lobes.
- Cardiovascular: No visible lesions.
- Urogenital: There was sub-capsular haemorrhage along the dorsal surface of both kidneys. There was free blood in the tunica vaginalis surrounding both testes, and the epididymis was congested.
- Diagnosis: Asphyxiation and severe trauma (cranial, thoracic and abdominal).

SB02-13Ph (CSL 0902)

- External: There was a round yellow tag in the right pectoral flipper only, numbered 4696. The hair was moulting around the flippers. There was sand around the flippers and the perianal hair.
- Internal: There was evidence of moderate blunt trauma with erythema of the blubber and deep haemorrhage of the pectoral muscle along the ventral sternum and left lateral thorax. There was free blood (approx 1 litre) in the abdomen. The animal was in good body condition with good internal fat reserves.
- Alimentary: The stomach was mostly empty with contents consisting of two partially digested squid mantles, some small fish bones, fluid and froth.
- Respiratory: There was mild laryngeal congestion. The tracheal and bronchial mucosae were congested, and there was bloody froth in the bronchi and lower airways. The pulmonary parenchyma had severe diffuse congestion, with marked interlobular and interstitial oedema.
- Cardiovascular: No visible lesions.
- Urogenital: No visible lesions.
- Diagnosis: Asphyxiation and moderate trauma to thorax and abdomen.

SB02-14Af (CSL 1109)

- External: There was a scar on the dorsal surface of the right pelvic flipper, possibly from a shark bite.
- Internal: There was focal blunt trauma along the thorax and scapulae characterised by erythema of the blubber and deep muscular haemorrhage along the ventral thorax, and the ventral and dorsal aspects of both scapulae. There was free blood (approximately 0.5 litre) in the abdomen. The animal was in excellent body condition with good fat reserves in the blubber.
- Alimentary: The oesophageal mucosa was stained yellow, which was likely to be caused by bile as the animal had not fed recently. The stomach was empty.
- Respiratory: Bloody fluid was observed in the trachea, bronchi and bronchioles. There was white stable froth, and blood-stained froth in the trachea and bronchi. The tracheal and bronchial mucosae were congested. The pulmonary parenchyma had severe diffuse congestion and oedema. There was occasional alveolar emphysema mostly around the periphery of the lobes.

Cardiovascular: No visible lesions.
Urogenital: There was sub-capsular haemorrhage extending from the cranial pole to midway along both kidneys.
Endocrine: The adrenal medullae were congested.
Diagnosis: Asphyxiation and moderate trauma (thoracic and abdominal).

SB02-15Ph (CSL 1108)

External: Both pectoral flippers had tag scars and the first lower left postcanine was missing. There was a small biopsy scar along the right dorsal pelvis, and the tip of the second digit of the right pelvic flipper was missing. All these features indicate the female was a study animal of the DOC sea lion population management team. Using an Allflex chip reader, a microchip was located in the dorsal pelvic area. It was removed but has yet to be identified using a Trovan chip reader, as the two systems are incompatible for chip identification. There was no inflammatory reaction of the tissues surrounding the microchip. The fur was moulting around the flippers.

Internal: There was severe blunt trauma with erythema of the blubber extending for a depth of 2.5 cm, and deep haemorrhage of the pectoral muscle along the ventral thorax. There was also haemorrhage of the subscapular muscle along the ventral and dorsal aspects of the right scapula that extended caudally along the intercostal muscles of the thorax. The ventral abdominal blubber and mammary gland were congested and there was free blood (approx 1 litre) in the abdomen. The animal was in excellent body condition with good internal fat reserves.

Alimentary: There was regurgitated food in the mouth and oesophagus. The stomach was full with contents consisting mostly of whole squid and stones, with some fish otoliths and lenses, and octopus beaks.

Respiratory: The tracheal and bronchial mucosae were congested. There was blood-stained froth and bloody fluid in the lumen of the trachea, bronchi and bronchioles. The pulmonary parenchyma had severe diffuse congestion, with marked interlobular and interstitial oedema. There was occasional alveolar emphysema in the periphery of the lobes.

Cardiovascular: No visible lesions.
Urogenital: There was mild subcapsular haemorrhage over the cranial poles of both kidneys. There was congestion around the cervix and in the left uterine endometrium.
Diagnosis: Asphyxiation and severe trauma to thorax and abdomen.

SB02-16Ph (CSL 1110)

External: Both eyes were congested and blood was oozing from the nose. The fur was moulting around the flippers and along the ventral thorax and abdomen. There was a small scar in the webbing between the second and third digits of the left pelvic flipper. A small (50 x 5 mm) open wound was observed on the ventral pad of the left pelvic flipper. The tip of the third digit of the right pelvic flipper was lacerated and attached by a small piece of tissue.

Internal: There was severe diffuse blunt trauma over the animal, characterised by erythema of the blubber extending up to a depth of 2.0 cm at some sites, and deep muscular haemorrhage. Working down the animal, there was contusion along the dorsal and lateral aspects of the skull, along the snout, and left lateral mandible. In addition, there was intraocular haemorrhage in

both eyes. In the cervical region, the blubber, superficial ventral cervical muscles, ventral cervical spinal muscle (*Longissimus colli*) and the cervical oesophageal serosa were haemorrhagic. The ventral thorax, abdomen (including the mammary gland), and the cranial and dorsal aspects of the sub-scapular muscle of both shoulders were congested or haemorrhagic. There was free blood in the abdomen (approx 1-2 litres), and the internal cavities of the carcass appeared congested with a lot of blood present.

- Alimentary: There was regurgitated food in the mouth and oesophagus. The stomach was mostly empty of digestible material with contents consisting of two whole squid, beaks, lenses and fish bones, otoliths and lenses.
- Respiratory: The tracheal and bronchial mucosae were severely congested. There was froth and bloody fluid in the airways. The pulmonary parenchyma was diffusely congested and oedematous. There was a single tapeworm larva in the left diaphragmatic lung lobe.
- Cardiovascular: No visible lesions.
- Urogenital: There was subcapsular haemorrhage along the medial aspect of the left kidney, and along the cranial pole of the right kidney.
- Diagnosis: Asphyxiation and severe trauma (cranial, cervical, thoracic and abdominal).

SB02-17Ph (CSL 1647)

- External: The hair was moulting around the flippers and along the ventral abdomen. There was a healing rip in the webbing between the first and second digits of the right pelvic flipper.
- Internal: There was severe blunt trauma characterised by erythema of the blubber and haemorrhage of the muscle along the dorsal aspect of the skull and neck and along the right lateral mandible. There was mild contusion along the ventral thorax. There was free blood (approx 1-2 litres) in the abdomen. The animal was in excellent body condition, with good internal fat reserves.
- Alimentary: There was a regurgitated squid in the oesophagus. The distal thoracic oesophageal mucosa had a small (15 mm) ulcer. The stomach was full of 10 whole squid, squid parts and fish bones, otoliths and lenses.
- Respiratory: The tracheal and bronchial mucosae were severely congested. There was froth and bloody fluid in the airways. The pulmonary parenchyma had severe diffuse congestion and oedema.
- Cardiovascular: No visible lesions.
- Urogenital: The dorsal and lateral aspects of both kidneys had subcapsular haemorrhage.
- Diagnosis: Asphyxiation and severe trauma (cranial, cervical, thoracic, abdominal).

Gross pathology summary: The trauma to the thorax and abdomen of four sea lions (SB02-07, 08, 11 & 13Ph) and the fur seal was mild to moderate and unlikely to significantly affect the survival of the animals if they had escaped the net. However, the trauma to the cranium, thoracic and abdominal regions on the remaining six sea lions was severe and may have reduced the probability of survival for these animals. The regurgitation of food in the mouth and/or nasal passages of four sea lions (SB02-07, 15, 16 & 17Ph) is of some concern, which if aspirated can cause aspiration pneumonia. Many animals also had subcapsular haemorrhage of the kidneys, and free blood in the abdominal cavity, which were likely caused by the trauma of entanglement or crushing. Some of the sea lions and the fur seal had tracheal and bronchial mucosal congestion and pulmonary emphysema. All the sea lions and the fur seal

had congested and oedematous lungs. These changes are consistent with asphyxiation or drowning.

Histopathology: A full range of tissue samples are taken from all major organs. Sections are currently being examined to determine the presence of microscopic lesions, confirm the cause of death, identify pathogenic agents such as bacteria, parasites and viruses, and confirm the reproductive status.

Serology: Blood samples are taken and archived that may at a later date be used for serological tests.

Bacteriology: Fecal samples are being collected in order to characterise the intestinal flora of these animals and include testing for *Salmonella* sp. and *Giardia* (a protozoal parasite). In addition, samples are collected from any gross lesions that appear to have a bacterial etiology.

Parasitology: Samples of parasites are collected from the lung, stomach and intestines and saved for specific identification and to determine the intestinal parasite burden. Most seals have larval cestodes encysted in their ventral abdominal blubber. Lung worm have not been observed grossly to date. Nematodes are consistently present in the stomach of pinnipeds and may be present in the esophagus and mouth in some as a result of regurgitation. A few pinnipeds have tapeworms in the small intestine and all pinnipeds have *Acanthocephalans* (thorny-headed worms) in the colon and terminal ileum.

Toxicology: Blubber is collected and stored frozen that may be used later for identification and quantification of organo-chlorine burdens and fatty acid analysis.

Reproductive status: To date, no female pinnipeds have had a fetus *in utero*. The baculum of all males are measured and retained for further studies on growth.

Aging: The left lower canine and first post-canine teeth are retained for aging purposes.

Genetics: Appropriate samples are collected for genetic studies that may be conducted either at Massey University or at the University of Canterbury.

Skulls: The skulls and lower jaws are retained for future morphometric studies.

Work to be completed

1. Confirmation of age of animals
2. Histological examination of major organs to determine cause of death, and
3. Histological examination of gonads to determine reproductive status