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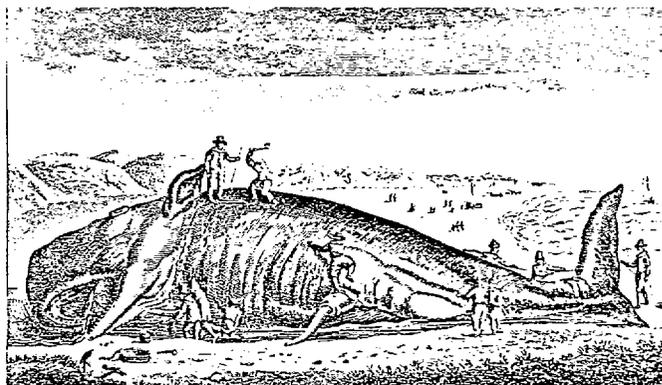
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A FIELD MANUAL
OF PROCEDURES FOR
POSTMORTEM EXAMINATION
OF ALASKAN MARINE MAMMALS



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OF ALASKAN MARINE MAMMALS

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PREFACE

Those who have walked, boated, or flown along the coasts of Alaska with an eye on the shoreline are aware that the quantity of beached carcasses of dead marine mammals is prodigious, amounting to hundreds or thousands of tons annually. This abundance of mammalian flesh is reflective of the multitude of living seals, sea lions, walrus, whales, and porpoises that inhabit the coastal waters of Alaska. Some unknown proportion of these myriad populations dies each year from various causes and, ultimately, some proportion of those washes ashore. For many years, the curious have probed lightly into this mass of smelly carcasses, mainly for souvenirs of bone or ivory. For a much longer time, the hungry natives along the coast depended on it as a natural resource. But until very recently, there was little real interest in assessment of its magnitude or determination of its causes.

This manual was developed primarily as a procedural standard for our own use and that of colleagues and students involved in an investigation of the morbidity and mortality of marine mammals in the Bering Sea and Gulf of Alaska (Research Unit No. 194), under the Outer Continental Shelf Environmental Assessment Program (OCS EAP/NOAA). It was designed for use in necropsies of specimens collected at sea and of dead and moribund animals found on the beach, the study of which can provide new insights into the normal

causes of illness and death. In its preparation, we have endeavored to utilize terminology that can be understood by the layman as well as by those versed in anatomical and veterinary science. A short glossary of terms that maybe unfamiliar to some users has been appended.

The procedures outlined are based on the assumption that the carcass to be examined is very fresh, and that the circumstances under which the necropsy is to be performed are nearly ideal. In reality, of course, this seldom will be the case. Hence, many of the steps indicated may not be feasible, due to the condition of the carcass, its location, the time available to the investigator, of the limitations in facilities and manpower. In each case, the investigator will need to assign his own priorities, depending on his objective and the attendant circumstances.

We do not regard this as a final, finished document. It may be substantially revised from time to time, as our experience and that of other users grows. We would encourage all users to note any modifications that they feel would be appropriate and to inform us of their recommendations.

F. H. F.
L. M. S.
R. A. D.

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INTRODUCTORY REMARKS

Clothing and Equipment

It should be borne in mind always that any sick, moribund, or dead animal must be handled with caution, since it is conceivable that it was affected by an infectious disease, the causative agent of which may be pathogenic in man or domestic animals. For this reason, it is advisable to wear suitable protective clothing and rubber gloves while performing the examination and to disinfect, boil, or burn that clothing after use. Since beached carcasses of marine mammals seldom are found in fresh condition, the wearing of such apparel conveys the added advantage of protecting the investigator and his normal clothing from being soiled by very oily, odoriferous material. Various kinds of disposable gloves, aprons, and foot coverings are available and may be most convenient to use in field situations where proper disinfection is not feasible.

Procedural Notes

Before beginning the actual necropsy, the following points should be considered, so that important data and valuable samples will not be lost. We recommend also that the user read through the actual necropsy procedures outlined beyond, before going into the field, so as to have in

mind the general approach and be prepared with the necessary equipment and supplies.

Photographs and Identification

The importance of high quality reference photographs of each specimen, for the purpose of subsequent identification of species, sex, relative age, and (for beached carcasses) general condition, should not be underestimated. Good clear photos of the pathological conditions also may be important supplements to the field notes. Exposures on fine-grained black and white film (e.g. Kodak Panatomic-X) ordinarily will be most useful. Certain identification of species and sex may be difficult, especially in beached carcasses, and a good set of photographs may be essential for final determination. Be sure to include a label in each photograph, showing the field number of the specimen. Our standard for labelling has been a plain white 3 x 5" (7.7 x 12.7 cm) file card with large block numbers, made with a 0.5 wide black felt-tip marker.

Blood and Serum

If the animal is still alive or has just been killed within the past 3 or 4 hours, it is preferable to take a blood sample immediately, before beginning the necropsy. In pinnipeds, this is most easily drawn (by syringe and needle) from the

intervertebral venous sinus by inserting the needle vertically, about midway between two of the dorsal spines of the vertebrae (Fig. 1). In sea otters, the femoral vein or heart may be the better source; in cetaceans, one of the larger vessels in the flukes seems best. In animals that have been gunshot, the sample should be taken as far from the wound as Possible, since the shock of the impacting bullet may cause great damage to the blood cells, hence excessive hemolysis and degradation of the sample for some purposes. For that reason, blood gushing from the wound frequently does not yield a satisfactory sample.

Whole blood is collected, using E. D.T.A. or another suitable anticoagulant. Reliable information on whole blood parameters, such as cell counts and packed cell volume, can be obtained only from samples drawn from living animals. If glucose is to be assayed, sodium flouride may be added to whole blood or serum to stop enzymatic action. Whole blood should be stored cool (preferably at 4 to 6°C) and analyzed as soon as possible after collection.

Blood samples from which serum is to be obtained (usually for antibody titres) should be handled gently and protected from freezing, in order to prevent hemolysis. Ideally, the sample should be allowed to stand at room temperature for 12 to 24 hours, in which time a clot will form. The clear serum can then be drawn or decanted off into

clean, sterile containers, preferably in 1 to 3 ml sub-samples, then stored frozen. Avoid repeated thawing and re-freezing of such samples.

Tissue Samples

Tissues for subsequent histopathological study should be preserved in 10% buffered formalin (2 g sodium acetate/10 ml 37% formaldehyde/90 ml water). For adequate fixation, the ratio of tissue to liquid by volume should be no greater than 1/1. In most cases, the tissue samples need not be larger than about 5 x 5 x 10 mm. Samples of normal tissues, as well as of those affected pathologically, should be preserved. Ideally, samples of the major organs should be taken routinely, whether or not any pathological conditions are recognized. In sampling lesions of potential histopathological value, it is preferable to cut the sample block so as one of its surfaces is the incision made directly through the lesion. This allows optimal fixing of the lesion itself by the formalin. It is preferable also that the block be trimmed in such a way that the surface containing the lesion can be identified easily after fixation, since color changes may take place while the tissue is in the fixative; sometimes the changes can obliterate small lesions that were highly visible in the fresh material.

In the field, containers such as "whirl-paks" (rather than bottles or jars) are most convenient for tissue preservation,

provided that they can be safeguarded from puncture and loss of fluid. If volume or weight becomes a problem (e.g. for shipment or convenience), most of the fluid can be drained off after the first 48 to 72 hrs (i.e. after fixation is complete).

Freezing of these preserved tissues should be avoided at all times, since the ice crystals forming in them will damage and distort the cells. Occasionally, in cold weather, it may be better to transport the samples fresh-frozen back to the base camp or laboratory, then thaw them thoroughly just before putting them into the formalin.

Tissue samples, especially of the blubber and liver, should be saved also for heavy metals and hydrocarbon assays. These should be larger chunks of about 50 g (1/8 lb) each. The liver samples for heavy metal assay can be stored in whirl-paks. Blubber and liver for hydrocarbon assay must not be allowed to come into contact with any plastic or other petroleum product. Hence, it should be wrapped in non-lubricated, commercial grade aluminum foil, well sealed to keep out contaminants. All such samples should be stored frozen.

Parasites

From a pathological aspect, there usually will be no need for a thorough parasitological examination of the carcass;

those parasites that are causing pathological damage will usually be apparent in the lesions recognized in the course of the necropsy. However, for those species of marine mammals that are rarely seen except as beached carcasses, such as some of the beaked whales, a full parasitological examination could be of great scientific value.

If the carcass is fresh, its helminth parasites probably will be still alive and active. Such living material is best prepared by, first, allowing the helminths to relax fully in tap water in a shallow dish at room temperature for about an hour. Then most of the water can be decanted off and the helminths instantly killed and fixed by pouring in hot (not boiling) 10% formalin. Helminths can be stored in this formalin; ectoparasites (lice, nasal mites) should be stored in 70% ethanol.

Microbiological Samples

Isolation of mycological (fungal), bacterial, and viral agents of disease should be attempted whenever feasible. In any but the freshest carcasses, this usually will not be effective, since the spread of contaminants takes place rapidly after death.

Aseptic technique is essential for both bacterial and viral isolates. Instruments should be sterile, and any organ from which a microbiological sample is to be taken must be exposed

carefully to avoid external contamination. If there is some possibility that the surface of the affected organ has already been contaminated, the area where the incision is to be made should be seared with a hot scalpel blade or swabbed with 10% formalin (less effectively, it can be swabbed with 70% ethanol). If the swabbing procedure is used, allow the excess liquid to air dry before making the incision, in order not to flood the incision with disinfectant.

The incision should be made with a sterile instrument, usually a scalpel. If there is any question about the sterility of the blade, heat it over a flame and allow it to cool before making the incision. For bacterial isolates, dip a sterile swab into the incision, twirling it slightly against the cut surfaces of the lesion, then immerse it in a vial of suitable transport medium (for example *Amies/DIFCO*), taking care not to touch the rim of the vial or the lower part of the swab stick (to be enclosed in the vial) with your hands. Break off the stick below the part that you have handled; cap, seal, and label the vial, and store it in a cool (not frozen) place. For viral isolates, the swab should first be immersed in the special virus transport medium, then dipped into the incision, then returned to the transport medium for storage (frozen).

Alternatively or in addition, small blocks of tissue (2-3 g each) from the affected organ can be removed aseptically and stored in sterile vials or whirl-paks. For bacterial isolates,

short-term storage (up to 1 week) at 4 to 6°C usually is satisfactory; for longer storage, -5 to 0°C is preferable. Tissues held for viral isolation should be stored frozen at low temperatures, preferably in liquid nitrogen.

Lesions suspected of being caused by a mycotic agent (usually on the skin) may be sampled by scraping the surface with a sterile scalpel blade and/or, with forceps, pulling a few hairs from the affected area. Ideally, these scrapings and hairs should then be inoculated into a suitable culture medium, directly, and incubated at room temperature for at least 2 to 3 weeks. Some suitable media for this purpose are Sabouraud's dextrose agar or any of several commercial products, such as Cal Lab DTM. If media are not available, scrapings and hairs may be stored in a clean vial or cellophane envelope, under refrigeration.

Trauma, Including Gunshot

Generally, half or more of the carcasses found on the beach are of animals that died from gunshot wounds, which are relatively easy to diagnose, if recent. However, this must be done with some caution. Small, finger-sized holes commonly are present in any carcass that has been on the beach for a few days, and most of these are not bullet holes but openings made by scavengers. Probe and dissect these out well, looking for further, more diagnostic evidence in the

deeper tissues, such as broken bones, hemorrhage, and other tissue damage. The majority of bullet wounds will be in the head or neck, since these are the usual target areas. Frequently, the head of a gunshot seal or sea lion will be missing entirely, except for one or two fragments of the base of the skull and a few tatters of skin, the rest having been removed by marine and terrestrial scavengers. In walruses, however, absence of the head usually is due to its having been cut or chopped off by man; in whales, loss of all or part of the head ordinarily is the result of predation by killer whales, which feed mainly on the tongue and throat of their cetacean prey.

If broken bones are encountered in the course of the necropsy, this should be noted. The presence of hemorrhage or inflammation about the break will indicate that it occurred before death; absence of these signs is indicative that it occurred sometime after death.

Wounds of various kinds are common. Describe these (location, length, depth), photograph them, and if feasible, excise the wound area and preserve it, preferably frozen, for possible subsequent determination of the cause. Wounds may be caused by a wide variety of agents, such as other marine mammals, polar bears, sharks, or man, and the nature of the wound often is diagnostic of the cause.

Labelling Samples

The importance of labelling all collected samples and photographs very clearly cannot be over-emphasized. A little extra care with this at the time of necropsy will save much time and frustration back at the laboratory. Each specimen must be assigned a field number, preferably incorporating some code for the location and the year (e.g. LCI-01-78, for the first specimen necropsied in Lower Cook Inlet in 1978), and that number should be clearly indicated on each label for each sample taken from that specimen. Paper or plastic labels should have the same information printed on both sides, in the event that one side becomes obliterated in the course of handling.

Beached Carcasses

Do not pass up the opportunity to perform a necropsy on beached carcasses, regardless of their condition. Even in those that have lain on the beach for several months, it usually will be possible to determine whether or not they were (1) gunshot, (2) killed by natural predators, (3) undernourished, or suffering from (4) broken bones, or (5) major organ damage. At the very least, it is usually possible to determine the species, age, and sex. While advanced postmortem changes in the tissues may preclude histopathological study, the possibility that some information can be obtained from the tissues should

not be overlooked, Animals that die from natural causes frequently become hypothermic before death, in which case the carcass cools well, and the tissues are remarkably well preserved for a long time.

Appended Aids

Figure 1 shows the procedure for drawing blood from the intervertebral venous sinus of a seal.

Figure 2 illustrates the main external features of pinnipeds and cetaceans useful in identifying their sex.

Figures 3 and 4 show the general layout of the organs in a pinniped and a cetacean, for your guidance.

A suggested list of basic equipment and supplies is given in Appendix 1.

As an aid to field identification of carcasses, an illustrated resumé of the main diagnostic characters of marine mammals known to occur in Alaskan waters is given in Appendix 11.

An annotated list of the kinds of pathological conditions and agents that may be encountered in Alaskan marine mammals is given in Appendix III.

NECROPSY PROCEDURE FOR SEA OTTERS, SEALS, SEA
LIONS, AND WALRUSES

External Examination

1. Identify SPECIES and SEX, at least tentatively (see Fig. 2). PHOTOGRAPH whole carcass in dorsal and ventral view, to show COLOR PATTERN, at least one FORE FLIPPER, the HEAD, and the GENITAL-PERIANAL area.

2. With the carcass lying on its back, straighten the spine as much as possible (e.g. by grasping the head and pulling) especially to straighten the neck. Measure the STANDARD LENGTH (tip of nose to tip of tail flesh, in a straight line) and GIRTH at the axillae. If the carcass is too large to roll or straighten, measure its length as best you can and note the method employed.

3. Examine the BODY SURFACE, noting the condition of the SKIN and HAIR and the presence of any ECTOPARASITES. Preserve (in alcohol) and label some of the latter, noting any unusual abundance of them or gross pathological effects. Describe and photograph any HOLES, LACERATIONS, or other lesions and any bloody or other DISCHARGES from the orifices. Swab abscesses and inflamed, draining wounds for possible isolation of bacterial agents. Sample suspected mycotic lesions, and preserve (in

formalin) a piece of tissue from such lesions for histopathological study.

4. With the carcass on its back, make an incision about 4 to 5 cm long over the sternum, midway between the axillae, cutting through the skin and blubber, and measure the **BLUBBER THICKNESS** at that point.

Internal Examination (Fig. 3)

1. Remove the ventral body wall from chin to anus, cutting through the costal cartilages, and lay it out, skin side down, to one side as a work table. In the case of large, unmanageable carcasses, the skin, blubber, and external musculature can be cut away in 25 to 50 kg slabs, the forelimb(s) can be removed, and the ribs disarticulate or sawn through, close to the spine, for removal.

2. Examine blubber for **HEMMORHAGES, CYSTS,** and **PARASITES**, noting presence and dimensions and preserving (in formalin) a sample of same. Excise a **BLUBBER SAMPLE** of at least 50 gm (1/8 lb), wrap it securely in aluminum foil (non-lubricated commercial grade), label, and store cold, preferably frozen.

3. Examine the **MOUTH** for any signs of **FOOD ITEMS, FOREIGN OBJECTS, ABSCESSSES,** or **DENTAL DISEASE.**

Inspect the anterior nares and nasopharynx for NASAL MITES, noting their abundance and preserving (in alcohol) a sample from each area,

4. If feasible, retain the SKULL and MANDIBLE for future reference and age determination. Alternatively, in animals other than walruses and bearded seals, disarticulate and remove the MANDIBLE and retain and label at least half of it (with canine tooth). In walruses, knock out (with hammer or rock) one or two of the largest lower teeth and retain and label same; in bearded seals, cut off, label, and retain the anterior (maxillary-premaxillary) part of the skull containing the upper canines.

5. Examine the thoracic and abdominal viscera *in situ*, noting their color and consistency. Estimate or measure approximate amounts of free FLUIDS in any areas and note any gross LESIONS, ADHESIONS, DISCOLORATIONS, or DEFORMITIES. If any body fluids seem excessive in amounts or, especially, if they are pinkish, whitish, or yellowish, dip a swab for possible bacterial isolates.

6. Remove the HEART, LUNGS, and TRACHEA, beginning at the pharynx and working back (leaving the esophagus and diaphragm in place), and lay them out on the removed body wall for inspection. Note COLOR and CONSISTENCY of lungs, palpating them between thumb and fingers to check

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for any FIRM AREAS. Incise and swab those areas, checking for PARASITES, ABSCESSSES, TUMORS, or TUBERCULAR LESIONS, Excise, preserve (in formalin), and label one or more samples from such areas, as well as from the apparently normal lung tissue. With scissors, open the trachea and bronchi to the extent possible, noting any CONGESTION, OBSTRUCTIONS, or PARASITES. Preserve samples (in formalin) and label same.

7. Open the pericardium and note the AMOUNT and COLOR of PER ICARDIAL FLUID. Examine the surface of the heart and note any PALE AREAS or HEMORRHAGES; excise a piece of tissue from such areas and preserve same (in formalin). Cautiously open the ventricles and, if possible, draw off a SERUM SAMPLE with a clean syringe; bottle and label same and store cold or frozen. Open the ventricles and atria further, noting the nature of the CLOT or its absence. Examine the interior of the ventricles for HEART-WORMS (filariid nematodes) and, if present, rinse them in water and preserve and label them. A piece of the diaphragm (5 x 5 cm) can be removed and stored cool in a whirl-pak for trichinosis assay.

8. Remove the liver and note any DISCOLORATIONS, GRANULARITY of the capsule, ROUNDED MARGINS of the lobes, and any LUMPS or CYSTS within its substance. Note also any pinhead-sized, whitish spots on the surface, just

under the capsule. Incise and swab lesions for potential bacterial and viral isolates, then excise and preserve samples of the normal as well as the abnormal-appearing tissue (in formalin). With scissors, open the gall bladder and major bile ducts to search for HELMINTHS. Preserve same (in formalin). Retain a 50 gm (1/8 lb) sample of the liver, label, and store frozen (in whirl-pak for heavy metals assay or in aluminum foil for hydrocarbons).

9. Remove the spleen and examine for HEMORRHAGES and other DISCOLORATIONS. Palpate for LUMPS or CYSTS. Trim off excess tissues and WEIGH it or measure its overall LENGTH. Slice it in several places to examine its internal structure. Excise, preserve, and label samples of any apparent abnormalities, as well as of the normal tissue.

10. Remove the esophagus and stomach together, separating the stomach from the intestine at the pylorus. Inspect all surfaces, noting any HEMORRHAGES or ULCERATIONS. With heavy scissors or sharp knife, open the esophagus and stomach, noting contents and any abnormalities of the internal surfaces, as well as the presence of HELMINTHS. Retain and preserve the stomach contents (in formalin), including the parasites, and save also samples of any abnormal tissues.

11. Separate the pancreas from the small gut and examine it for LUMPS and DISCOLORATIONS. With small scissors,

open some of the pancreatic ducts and search for HELMINTHS. Preserve and label same.

12. Remove the entire large and small intestines. If the specimen is not fresh, these will be very flaccid and discolored or, perhaps, inflated with gas, in which case they usually are not useful in diagnosis and can be discarded. If the specimen is fresh, the small intestine will be firm and rounded and should be examined thoroughly. Cut or tear the mesentery from the loops to allow them to straighten out; then, starting at the pyloric end, examine the external surface, noting any LUMPS, PERFORATIONS, HEMORRHAGES, or other abnormalities. With blunt-ended scissors, open the gut lengthwise in a dishpan or pail of fresh water, examining the inner surface for LESIONS and noting the presence of PARASITIC WORMS. Preserve some of the latter and excise and preserve samples of any significant lesions.

13. Examine the kidneys and adrenal glands in place, noting the presence of any ADHESIONS, ABSCESSSES, or HEMORRHAGES. Remove each kidney, scrape excess blood from the capsule with the blade of your knife, and re-examine it closely; then slice it in half, and inspect the cut surfaces, looking especially for CYSTS, STONES, and INFARCTS. Incise and swab any affected areas. Open the ureters and bladder, noting the color of the URINE, condition of the inner lining, and presence of HELMINTHS. Excise and preserve any

abnormalities, as well as some normal tissue from at least one kidney.

14. Remove the entire reproductive tract of the female and, with a sharp knife or heavy scissors, open it from vulva to oviducts, noting the presence and size of any FETUS or EMBRYO and any TUMORS, ABSCESES, or excessive amounts of MUCOUS or other FLUIDS. Incise and swab any lesions and preserve samples of same. Note greatest WIDTH and COLOR of any placental scars. Remove and preserve (formalin) both OVARIES. Examine the male reproductive tract by palpation and incision, noting and preserving any abnormalities. Measure the LENGTH of the testes, and retain the BACULUM for age determination, if no teeth are available.

**NECROPSY PROCEDURE FOR WHALES, DOLPHINS,
AND PORPOISES**

External Examination

1. Identify **SPECIES** and **SEX**, at least tentatively (see Fig. 2). **PHOTOGRAPH** at least one overall view of the carcass to show the **COLOR PATTERN**, the **DORSAL FIN** (if any), and at least one **FLIPPER**. Additional photos of the **HEAD** to show its **PROFILE**, the **TEETH** or **BALEEN**, the position of the **EYE**, and any **THROAT GROOVES** could be very useful for identification. Also photograph the **GENITOPERIANAL** area and the **FLUKES**.

2. Measure the **STANDARD LENGTH**, from tip of snout to fork of tail, in a straight line, noting the method employed if it is not feasible to straighten the spine. Note the **NUMBER** and maximal **LENGTH** of the **THROAT GROOVES** or folds.

3. Examine the surface of the body, head, and appendages, noting the location of any **ECTOPARASITES** and preserving (in formalin) a sample of same. Describe any **WOUNDS** or **SCARS** and any bloody or other **DISCHARGES** from any orifices. Note any **LESIONS** and preserve (in formalin) samples of same.

4. Examine the blowhole(s) and dissect open the **NASAL**

AIR SACS, noting the presence of any FLUIDS, OBSTRUCTIONS, or HELMINTHS. Preserve a sample of same.

5. If possible, open the mouth and note the NUMBER and LOCATION of any TEETH or, if it is a baleen whale, the LENGTH, WIDTH, and COLOR of the longest BALEEN PLATES. Remove, label, and retain one or two teeth or plates for further reference and age determination.

6. Make an incision through the skin and blubber about midway along the side and measure the BLUBBER THICKNESS to the nearest millimeter. (The incision should be small enough to prevent distortion, but its size will depend on the size of the animal and thickness of its blubber.)

Internal Examination (Fig. 4)

1. With the animal lying on its side, remove the skin and blubber from the lateral body wall, noting the presence of any localized HEMORRHAGES, ABSCESSSES, CYSTS, or HELMINTHS in the blubber. Preserve (in formalin) samples of same, and swab abscessed areas for potential bacterial isolates. Excise a BLUBBER SAMPLE of about 50 gm (1/8 lb), wrap it securely in aluminum foil (non-lubricated commercial grade), label, and store cold, preferably frozen. Lay out one or more of the slabs of skin and blubber to one side for a work surface.

2. Remove the fore limb, then the remainder of the **body wall** from just behind the eye to the anus. This will require disarticulation of the ribs dorsally and cutting through the costal cartilages ventrally, checking for **BROKEN BONES** and any associated **HEMORRHAGE** or **INFLAMMATION**.

3. Scan the thoracic and abdominal viscera, in place, noting any **DISCOLORATIONS**, **ADHESIONS**, or excessive amounts of free **FLUIDS** in the body cavities. Incise and swab any major **LESIONS** for possible bacterial isolates, and preserve in formalin samples of the affected tissues. Coelomic fluids suspected of being unusual in amount or quality also should be swabbed and their total volume measured or estimated.

4. Open the pericardial sac, noting the **AMOUNT** and **COLOR** of the pericardial fluid. Remove the heart and examine its surface for **INFARCTS** or localized **HEMORRHAGES** or other defects, preserving samples of these. Cautiously open the ventricles and, if possible, draw off a **SERUM SAMPLE** with a clean syringe; bottle and label same and store cold or frozen. Open the ventricles and atria further, noting the nature of the **CLOT** or its absence. Examine the interior of the ventricles for **HEARTWORMS** (filariid nematodes) and, if present, rinse them in water and preserve them.

5. Remove the trachea and lungs, leaving the esophagus

and diaphragm in place. Palpate the lungs, checking for **FIRM AREAS** and **DISCOLORATIONS** of the surface that could be indicative of internal lesions. Incise and swab such areas for bacterial isolates, and preserve samples of the tissue in formalin. With a pair of scissors (preferably sterile), open the trachea and bronchi, noting any signs of **CONGESTION**, **OBSTRUCTION**, or **HELMINTHS** and preserving samples of same. If sterile procedure was used, swabs of the mucous may be useful for bacterial and viral isolation.

6. Remove the liver and note any **DISCOLORATIONS**, **GRANULARITY** of the capsule, **SWELLING** (rounded margins), or **LUMPS** or **CYSTS** within its substance. Incise and swab any such lesions and preserve samples of the tissue. With a sharp knife, slice each lobe in several places to examine its internal structure, preserving samples of any apparent abnormalities, as well as some normal tissue. With scissors, open the gall bladder and bile ducts to search for **HELMINTHS** and **STONES**, noting their presence and preserving samples. Retain two 50 g (1/8 lb) samples of the liver for heavy metals and hydrocarbon assays (whirl-pak and aluminum foil wrap, respectively) and store frozen.

7. Remove the spleen and examine for **HEMORRHAGES** and other **DISCOLORATIONS**. Palpate for **LUMPS** or **CYSTS**. Trim off excess tissues and **WEIGH** it or measure its overall **LENGTH** and greatest **WIDTH**. Slice it in several

places to examine its internal structure, Excise, preserve, and label samples of any abnormalities, as well as of the normal tissue.

8. Remove the esophagus and stomach together, separating the stomach from the intestine at the pylorus. Inspect all surfaces, noting any HEMORRHAGES or ULCERATIONS. With heavy scissors or sharp knife, open the esophagus and stomach, noting contents and any abnormalities of the internal surfaces, as well as the presence of HELMINTHS. Retain and preserve the parasites and the stomach contents (in formalin), or if very large, a subsample of each, as well as of any abnormal tissues.

9. Separate the pancreas from the small gut and examine it for LUMPS and DISCOLORATIONS. Incise and swab any suspected lesions and preserve samples of the tissue. With scissors, open some of the pancreatic ducts, searching for HELMINTHS; preserve some.

10. Remove the entire large and small intestines. If the specimen is not fresh, these will be very flaccid and discolored or, perhaps, inflated by gas. For most purposes, the gut in this condition is useless in diagnosis, though it may still be possible to recognize major lesions, such as ULCERATIONS, INTUSSUSCEPTIONS, and other obstructions. If the specimen is fresh, the small gut will be more rounded and firm

and should be examined thoroughly. Cut or tear the mesenteries from the loops to allow them to be straightened, then, starting at the pyloric end, examine the outer surface for any abnormalities. With blunt-ended scissors, open the gut lengthwise into a dishpan or bucket of water, which can be used to wash the mucosa clean of digesta. In a large whale, a very sharp knife may work better than scissors, and the gut will need to be handled in short lengths. Clean and inspect the inner surface for any LESIONS and HELMINTHS, saving (in formalin) samples of each and noting their location,

11. Examine kidneys and strip the capsule for a better view, slice each one open, noting any HEMORRHAGES, INFARCTS, CYSTS, STONES, or ABSCESSSES. Swab any lesions for possible bacterial and viral isolates, and preserve samples of normal and abnormal tissues. Open the bladder, noting COLOR of urine and inspecting for HELMINTHS.

12. Remove the entire reproductive tract of the female and, with a sharp knife or heavy scissors, open it from vulva to oviducts, noting the presence and size of any FETUS or EMBRYO and any TUMORS, ABSCESSSES, or excessive amounts of MUCOUS or other FLUIDS. Note greatest WIDTH and COLOR of any placental scars. Remove and preserve (formalin) both OVARIES. Examine the reproductive tract of the male by palpation and incision. Measure the length of the testes.

13. Returning to the head, carefully disarticulate and remove the lower jaw, taking care not to damage the auditory region. Inspect the inside of the mouth, the tongue and the pharynx, noting any LESIONS, SCARS, or DENTAL DISEASE, preserving samples of same. Then open the pterygoid sinuses, examining for the presence of HELMINTHS and noting the condition of the lining. Continue this examination into the auditory region.

14. If the specimen is a baleen whale, dissect out the auditory canal and remove the WAX PLUG at the proximal end, very carefully. Fix the plug in 10% formalin or pack it gently into a rigid container for possible future use in age determination. In a large whale, the plug may be up to 15 cm long and 5 cm in diameter, and very fragile.

15. Remove the bulls, exposing the middle ear chamber to view. Examine for HELMINTHS, noting any signs of INFLAMMATION, free FLUIDS, or MECHANICAL DAMAGE caused by the parasites. Preserve some of the parasites and a sample of the affected tissue.

16. If the specimen is fresh, sever the head from the body, watching for HELMINTHS, HEMORRHAGES, or other signs of damage in the spinal cord and canal, and preserving samples of same. If the skull is not to be saved, break or cut it open (an axe or chain saw may be needed

for this operation on large whales) to expose the brain. Examine the surface of the brain, noting any local HEMORRHAGES or other LESIONS. Slice through it in several places, and preserve samples of any areas suspected of pathological importance, noting their location. Watch especially for any HELMINTHS and preserve some separately, as well as in place in the lesions.

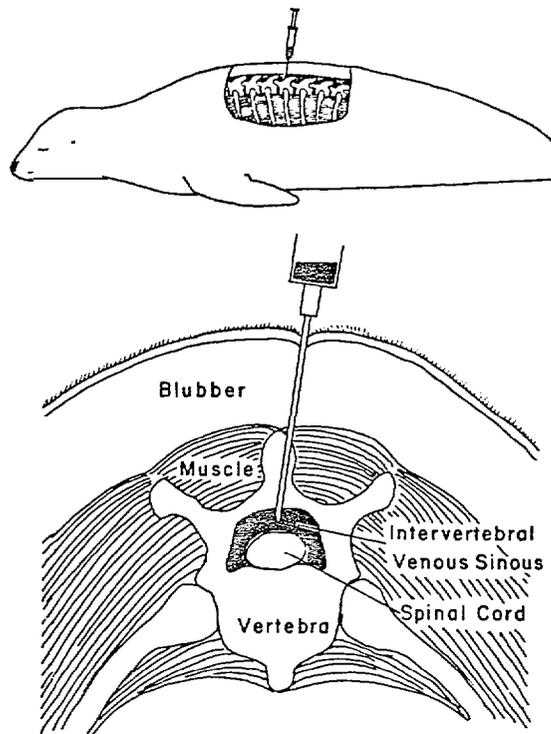


Figure 1. Procedure for drawing blood from pinnipeds, out of the extramural intervertebral venous sinus. Upper - lateral, cutaway view, showing insertion of the needle so as to strike the space between two vertebrae; lower - cross section, showing position of the intervertebral sinus, relative to the spinal cord.

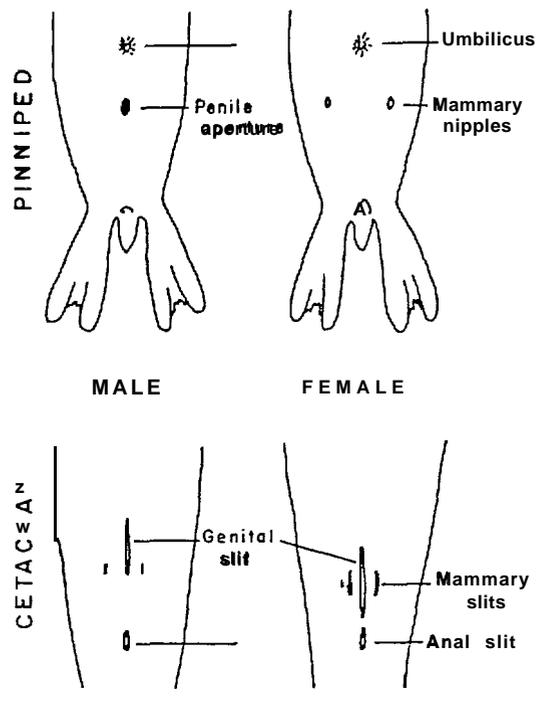


Figure 2. General external features (ventral view) of male and female pinnipeds and cetaceans, useful for identifying the sex. Features of the sea otter are basically the same as for a seal. In cetaceans, insertion of a probe into the genital slit may be more diagnostic; it will pass anterior from the slit in the female, posterior in the male (cf. Fig. 4).

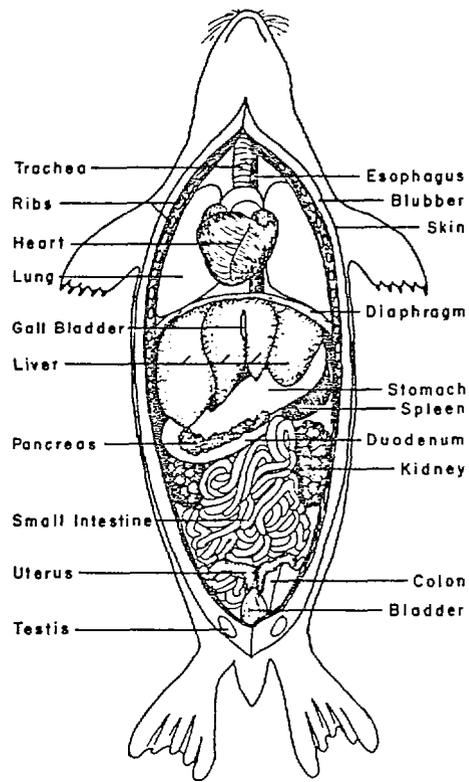


Figure 3. Semidiagrammatic view of the general layout of internal organs in a seal. The arrangement is similar in a sea otter. Reproductive organs of both sexes are shown,

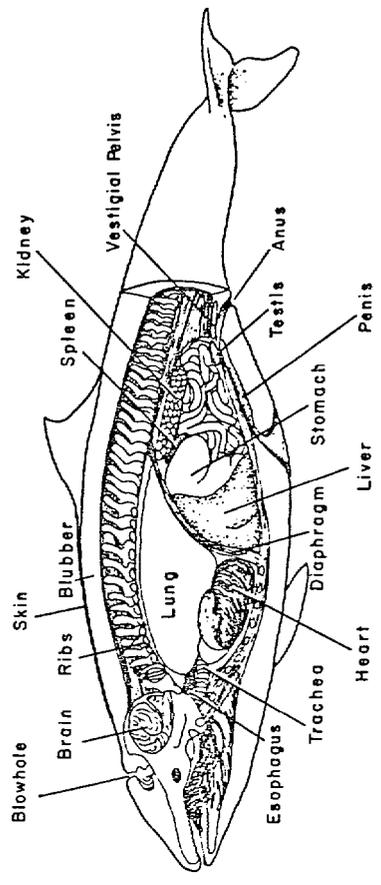


Figure 4. Semi-diagrammatic view of the general arrangement of internal organs in a male porpoise.

GLOSSARY

ABDOMEN	The portion of the body cavity behind the diaphragm.
ABSCESS	A pus-filled site of infection.
ADHESION	An abnormal union of an organ or part with another, adjacent to it.
AGENT	The parasite, bacterium, virus, or fungus responsible for causing the observed pathological condition.
ASEPTIC	Sterile; free of contaminants.
AXILLA	The armpit.
BACULUM	The bony part of the penis.
BALEEN	The horny plates arranged in a row along each side of the upper jaw of the toothless whales.
BLUBBER	The layer of fatty tissue between the skin and the muscles of marine mammals.
BRONCHI	The air passages within the lungs.
BULLA	The hard, usually rounded shell of bone that encloses the middle ear chamber,
CAPSULE	The tough, thin outer covering of such organs as the liver and kidneys.
CETACEAN	Whale, dolphin, or porpoise,
CLOT	A gelatinous mass of fibrin and blood cells which forms when the blood congeals.
COELOMIC FLUIDS	Free fluids in the body cavity.

CONGESTION	An abnormal accumulation of fluids, usually blood, within the substance of an organ,
CONTAMINANT	An undesirable, unwanted material [usually bacterial or chemical).
COSTAL CARTILAGE	The flexible, cartilaginous part of a rib.
CULTURE MEDIUM	A sterile nutrient-rich mixture, usually including a gelatinous constituent, on or in which bacteria or other agents will grow and multiply.
CYST	An enclosed bladder within a tissue or organ, having a definite fibrous wall and usually containing fluid.
DECANT	To pour off the lighter, upper layer of fluid, leaving the heavier solids behind.
DISARTICULATE	To separate one bone from another by cutting through the soft parts at the joint.
DISCHARGE	Fluid oozing from an opening,
DORSAL FIN	The single fin on the back of most cetaceans.
DRAINING WOUND	A wound from which blood, pus, or other fluids are oozing.
ECTOPARASITES	Parasites found on the exterior of the body.
EXCISE	cut out.
FEMORAL VEIN	A large, thin-walled blind vessel on the inner surface of the hind leg.
FIXATIVE	A preserving solution.

FLUKES	The broad, horizontal propulsive organ on the end of the tail of cetaceans.
FORMALIN	Formaldehyde solution 37% by weight, mixed with water, usually in the ratio of 1:9, to make a 10% solution.
HELMINTH	A worm.
HEMOLYSIS	Release of the contents of the red blood cells, due to damage or deterioration of the cell walls.
HEMORRHAGE	Escape of blood from the vessels into the tissues, usually due to injury of the vessel walls.
HISTOPATHOLOGY	The study of disease conditions at the cellular level.
INCISE	Slice into.
INFARCT	A localized or circumscribed area of pale, dead cells, caused by stoppage of blood flow to the area.
INFECTIOUS DISEASE	Disease caused by invasion of the body by a pathogenic agent, which subsequently grows and multiplies.
INFLAMMATION	Reaction of the tissues to injury, usually causing redness and swelling.
INTERVERTEBRAL VENOUS SINUS	A broad, voluminous complex of veins lying in the vertebral canal, just above the spinal cord and accessible for withdrawal of blood by inserting the needle between the vertebrae.

INTUSSUSCEPTION	In the intestine, the slipping or passage of one part into another, causing swelling, restriction of blood flow, and blockage of the intestinal canal.
ISOLATION	Removal and cultivation of a pathogenic agent, usually for the purpose of identification.
LACERATION	A wound made by tearing,
LARYNX	The voice-box, in the throat, at the anterior end of the trachea.
LESION	A morphological alteration of an organ or tissue, due to disease.
MANDIBLE	The lower jaw.
MESENTERIES	The translucent, membranous tissue that connects the intestine to the body wall.
MORBIDITY	The state of being diseased, or rate of occurrence of diseased individuals.
MORIBUND	In a dying condition.
MORTALITY	The number or rate of occurrence of deaths.
MYCOSIS	A disease condition caused by a fungus.
NECROPSY	Autopsy; examination of the body after death to ascertain the cause of death and the nature of contributing pathological conditions.
ORGAN	A major part of the body adapted for a specific function or set of functions. The body is made up of many organs which function cooperatively as systems. Each organ is made up of several kinds of tissues.

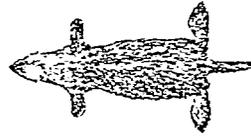
ORIFICE	An opening or entrance to a cavity or tube.
PALPATE	Examine by touch, using the fingers.
PATHOGENIC	Producing or capable of producing disease.
PERIANAL	The area around the anus.
PERICARDIUM	The membranous sac enclosing the heart.
PHARYNX	The anterior part of the digestive tract, just behind the nasal passage and ahead of the esophagus.
PINNIPED	Seal, sea lion, or walrus; the fin-footed carnivores.
PTERYGOID SINUS	In cetaceans, a membranous sac on each side of the base of the skull, extending from the pterygoid bones to the ear.
PYLORUS	The area in which the stomach opens into the intestine.
SERUM	The liquid part of the blood that remains after clotting.
STERNUM	The breast bone.
SWAB	A slender stick with a bit of cotton wrapped on one end, used during necropsy for wiping (swabbing) lesions suspected to contain pathogenic agents, in order to culture and identify the agents.
TISSUE	An aggregation of similar cells, making up part of an organ.
THORAX	The part of the body cavity ahead of the diaphragm.

TRACHEA	The windpipe, extending from the larynx to the lungs.
TRANSPORT MEDIUM	A sterile nutrient-rich mixture, usually liquid, in which living agents of disease can be stored for some period of time during transit from the field necropsy site to the laboratory.
TRICHINOSIS	A disease caused by the helminth <i>Trichinella spiralis</i> , which encysts in the muscles, especially the diaphragm.
ULCER	An abnormal break in the continuity of tissue, with associated inflammation.

APPENDIX I
SUGGESTED LIST OF BASIC EQUIPMENT AND SUPPLIES

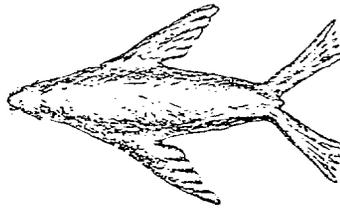
Tools:	Tissue Sampling:
Knife, straight, pointed, 8" (20 cm) blade	Formalin, 10%, buffered
Scalpel handle, large	Ethanol, 70%
Scalpel blades, sterile	Whirl-paks, 23 x 11 cm
Scissors, blunt point, 16 or 17 cm	Aluminum foil, non-lubricated
Forceps, mouse-toothed	Freezer tape
Forceps, blunt, 16 or 17 cm	
Axe	Recording:
Whetstone	Camera & film
	Tapemeasure, metric
Blood Collection:	File cards, plain, 3 x 5" (7.7 x 12.7 cm)
Syringes, disposable, 20 or 30 ml	Felt-tip marker, black
Needles, 17 gu, 9 cm (3½")	Pencils, 2H
Collection tubes, 20 ml	Data sheets or notebook
Serum storage tubes, 3 ml	
	Miscellaneous:
Microbiology:	Protective clothing
Swabs, sterile	Rubber gloves
Transport media, bacterial & viral	Plastic bags, various sizes
Mycological media	Paper towels
Vials, screw cap, sterile, 2 dr.	Disinfectant soap

APPENDIX II
 PRINCIPAL DIAGNOSTIC CHARACTERS OF MARINE MAMMALS
 KNOWN TO OCCUR IN ALASKAN WATERS



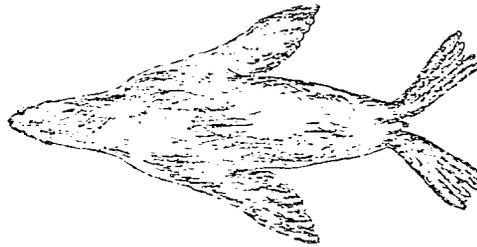
Sea Otter
 (*Enhydra lutris*)
 Status: Common, North
 Pacific Ocean &
 S. Bering Sea.

L: 60 to 150 cm; Wt: 2 to 35 kg; distinct tail $\frac{1}{4}$ of overall L.; dense, soft fur dark brown to blackish, paler on head; hind limbs paddle-shaped, 5th toe longest; forelimbs small, rounded, w/retractile claws.



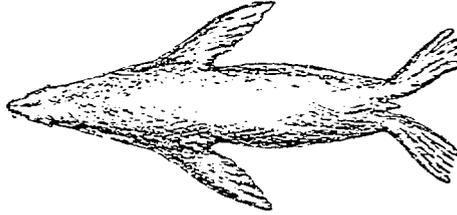
Northern Fur Seal
 (*Cailorhinus ursinus*)
 Status: Common, North
 Pacific Ocean &
 S. Bering Sea.

L: 60 to 240 cm; Wt: 5 to 270 kg; dense soft fur, dark brown to blackish; flippers long, naked, black w/tiny nails; hind flipper more than $\frac{1}{4}$ of overall length; four mammae.



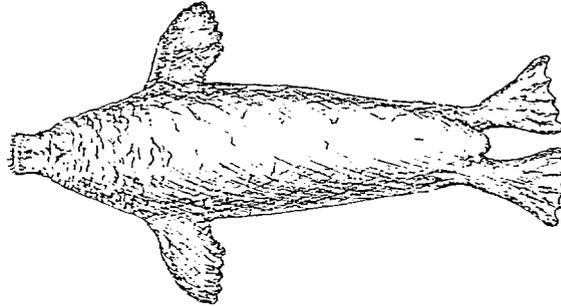
Steller's Sea Lion
 (*Eumetopias jubatus*)
 Status: Common, N.
 Pacific Ocean &
 Bering Sea

L: 105 to 320 cm; Wt: 18 to 1000 kg; short, coarse hair, tawny to brownish; flippers very large, blackish, naked w/small nails; hind flipper about $\frac{1}{5}$ of overall length; four mammae.



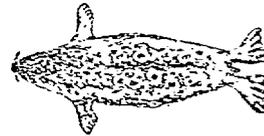
California Sea Lion
(*Zalophus californianus*)
Status: rare; Gulf of
Alaska.

L: 76 to 245 cm; Wt: 6 to 350 kg; short, dense hair, chocolate brown, slender, w/blackish, naked flippers w/ small nails; hind flippers about 1/6 of overall length; four mammae.



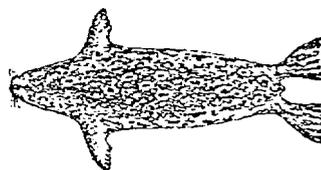
Walrus
(*Odobenus rosmarus*)
Status: Common. Bering
and Chukchi Seas; rare,
Gulf of Alaska.

L: 120 to 335 cm; Wt: 45 to 1600 kg; very large, curved tusks; hair short, sparse, brown to tawny; flippers naked, grayish to blackish w/ small nails; hind flipper about 1/5 of overall length; four mammae.



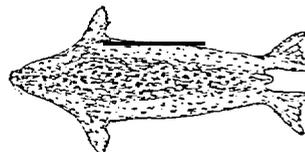
Ringed Seal
(*Phoca hispida*)
Status: Common, Bering,
Chukchi, Beaufort Seas.

L: 60 to 150 cm; Wt: 4.5 to 115 kg; pup w/whitish, woolly coat; adult grayish silvery w/darker mantle and saddle having abundant light rings; few or no spots on ventral parts; flippers haired w/very smut. strong claws; two mammae.



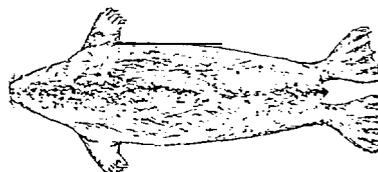
Harbor Seal
(*Phoca vitulina*)
Status: Common, North
Pacific Ocean &
S. Bering Sea.

L: 75 to 180 cm; Wt: 9 to 160 kg; short coarse hair from birth; color ranging from nearly black overall, w/scattered whitish rings, to Dale and spotted like spotted seal, but w/some whitish rings on back; flippers haired w/strong claws; hyoid arch reduced, usually not attached to auditory bullae; two mammae



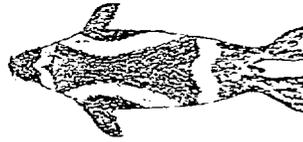
Spotted Seal
(*Phocalargha*)
Status: Common, Bering
& Chukchi Seas;
uncommon Beau fort.

L: 75 to 180 cm; Wt: 7 to 120 kg; pup w/whitish, woolly coat; adult hair she%, coarse, silvery w/gray saddle, many small, black spots overall; flippers haired, w/strong claws; hyoid arch strong, attached to bullae; two mammae.



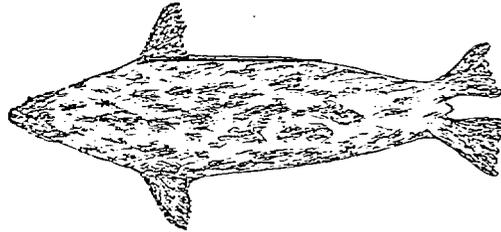
Bearded Seal
(*Erignathus barbatus*)
Status: Common, Bering,
Chukchi & Beau fort Seas.

L: 120 to 230 cm; Wt: 25 to 365 kg; pup (newborn) dark gray-brown w/whitish forelimbs and blotches on back; adults pale grayish to buff w/slightly darker saddle, sometimes w/rusty head and neck; flippers haired w/very smut claws; toes of forelimbs about equal in length; four mammae.



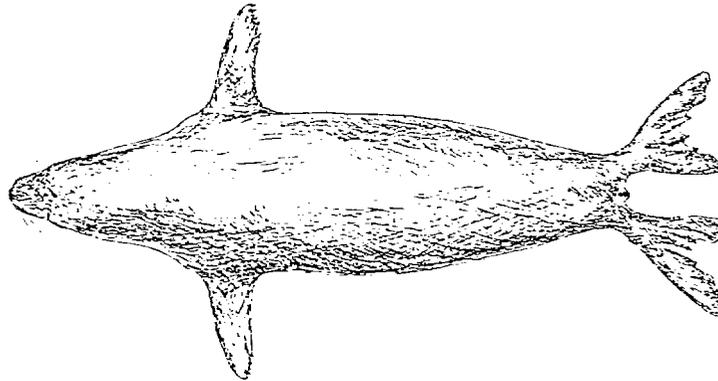
Ribbon Seal
(*Phoca fasciata*)
Status: Common. Bering
& Chukchi Seas.

L: 75 to 150 cm; Wt: 7 to 145 kg; pup w/white, woolly coat; adult males dark brown to black w/broad silvery bands encircling the neck, each forelimb, and the abdomen; female w/similar but much paler, grayish pattern; flippers haired w/strong claws; two mammae.



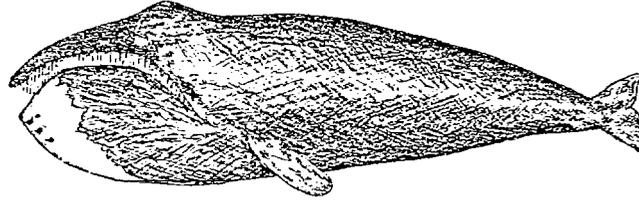
Hooded Seal
(*Cystophora cristata*)
Status: Rare, Chukchi
& Beaufort Seas.

L: 105 to 305 cm; Wt: 23 to 409 kg; pup silvery w/bluish-gray back; adults silvery-gray w/scattered black blotches & spots, face and flippers darkest; flippers haired w/strong claws; hind flipper about 1/6 of overall length; two mammae.

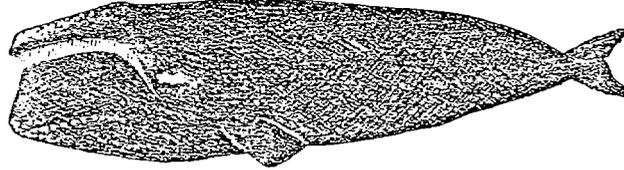


Northern Elephant Seal
(*Mirounga angustirostris*)
Status: Rare, Gulf of
Alaska.

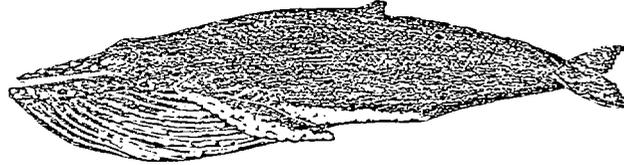
L: 120 to 600 cm; Wt: 35 to 3600 kg; hair short, sparse, grayish to brownish; flippers haired w/small claws; fore flippers slender, pointed; hind flipper 1/6 of overall length, middle toes much shorter than outer; two mammae.



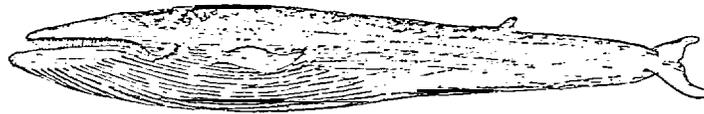
Bowhead Whale
(*Balaena mysticetus*)
Status: Common, Bering, Chukchi, & Beaufort seas.
L: to 17.7 m; mouth 1/4 to 1/3 of total length; baleen slender, black, to 4.5 m, w/up to 325 plates per side. anterior gap between sides; body robust, black. usually w/some white on chin a/o snout; no throat folds; no dorsal fin.



Pacific Right Whale
(*Eubalaena glacialis*)
Status: Rare, North Pacific Ocean, S. Bering Sea.
L: to 15.2 m; mouth 1/5 to 1/4 of total length; baleen slender, black, to 2.2 m, w/up to 390 plates per side and anterior gap; body robust, black w/whitish, horny "bonnet" on snout, chin, and over eye; no dorsal fin

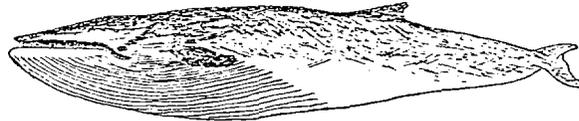


Humpback Whale
(*Megaptera novaeangliae*)
Status: Locally common, Gulf of Alaska.
L: to 15.9 m; mouth 1/5 of total length; baleen gray-black w/coarse fringe, to 85 cm, w/up to 400 plates per side, no anterior gap; body robust with small dorsal fin; 14 to 20 coarse throat folds extending 1/2 the length of the body; prominent tubercles on snout and lower lip; extremely long, slender flippers.



Blue Whale
(*Balaenoptera musculus*)
Status: Uncommon,
Norm Pacific Ocean,
S. Bering Sea,

L: to 27.5; mouth 1/5 of total length; baleen broad, blackish, to 1.2 m, w/up to 400 plates per side, continuous around front of mouth; snout broad & flat; 80 to 100 throat folds extending > 1/2 the length of the body; small dorsal fin.



Fin Whale
(*Balaenoptera physalus*)
Status: Common, North
Pacific Ocean; uncommon
Bering & Chukchi Seas.

L: to 22.9 m; mouth 1/5 to 1/4 total length; baleen broad, whitish to blue-gray w/light stripes, to 70 cm, w/up to 430 plates per side, no anterior gap; body very slender w/prominent, hooked dorsal fin; 60 to 110 throat folds extending to 1/2 the length of the body.



Sei Whale
(*Balaenoptera borealis*)
Status: Common, North
Pacific Ocean.

L: to 18.6 m; mouth 1/5 to 1/4 total length; baleen black w/very fine whitish fringe, to 49 cm, w/up to 315 plates per side; no anterior gap; body chunky w/prominent triangular dorsal fin; 30 to 60 throat folds extending 2/5 the length of the body.



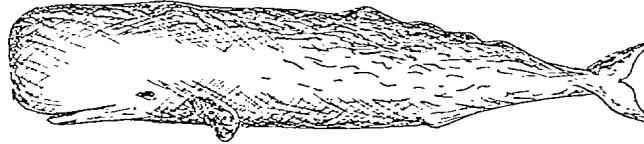
Minke Whale
*(Balaenoptera
 acutorostrata)*
 Status: Common, North
 Pacific Ocean, Bering
 & Chukchi Seas.

L: to 8.3 m; mouth 1/5 of total length; baleen whitish w/fine fringe, to 21 cm. w/up to 270 plates per side, no anterior gap; body chunky w/prominent, hooked dorsal fin; about 50 throat folds extending 1/3 to 1/2 length of body; distinct white band on each flipper.



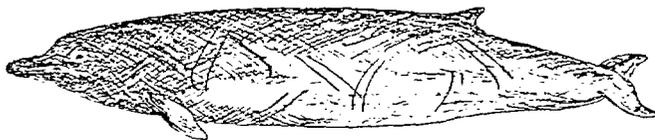
Gray Whale
(Eschrichtius robustus)
 Status: Common, Gulf of
 Alaska. Bering & Chukchi
 Seas; uncommon Beaufort.

L: to 15 m; mouth to 1/5 total length; baleen yellowish w/coarse fringe, to 48 cm, w/up to 180 plates per side, anterior gap; dorsal fin inconspicuous. the most anterior of several low humps; 2 to 4 short throat folds.



Sperm Whale
(Physeter catodon)
 Status: Common, North
 Pacific Ocean.

L: to 20.4 m; chunky, w/squarish snout and single, left blowhole far anterior; long, slender lower jaw w/20-30 pairs conical teeth; no teeth in upper jaw; low, inconspicuous dorsal fin.



Baird's Beaked Whale
(*Berardius bairdi*)
Status: Common, North
Pacific & S. Bering.

L: to 12.5 m; bulging forehead and beaklike snout; 1 to 2 prs of teeth at anterior end of lower jaw only; low triangular dorsal fin; small rounded flippers; often w/abundant deep scars and lacerations.



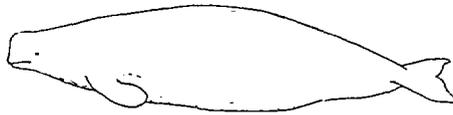
Cuvier's Beaked Whale
(*Ziphius cavirostris*)
Status: Common, North
Pacific.

L: m 7 m; sloping forehead and short beak, w/1 pr of teeth at anterior end of lower jaw; small, hooked dorsal fin; flippers lanceolate; back & flanks often show many linear scars.



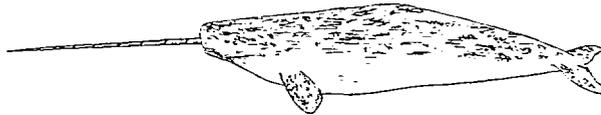
Bering Sea Beaked Whale
(*Mesoplodon stejnegeri*)
Status: Common, North
Pacific & S. Bering.

L: to 5.2 m; sloping forehead w/long beak; 1 pr of large, spatulate teeth about 1/2-way along lower jaw; prominent triangular dorsal fin; flippers lanceolate; body often w/many linear scars.



White Whale or Belukha
(*Delphinapterus leucas*)
Status: Common, Bering,
Chukchi, Beaufort Seas &
Cook Inlet; uncommon,
Gulf of Alaska.

L: to 6 m; bulbous forehead w/very short beak; B to 10 prsteeth in upper and in lower jaws; no dorsal fin; flippers rounded; color slate-blue (young) to creamy white (adult).



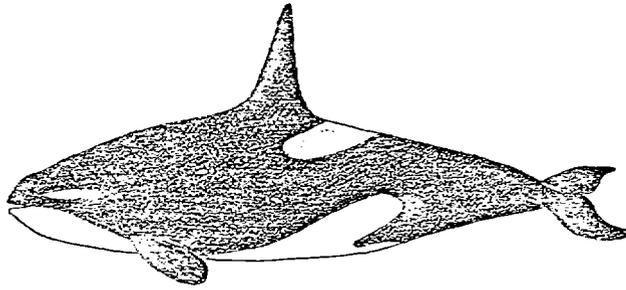
Narwhal
(*Monodon monocerus*)
Status: Rare, Bering
Chukchi & Beaufort Seas.

L: to 6 m; bulbous forehead w/no beak; single, spiralled tusk in male (none in female). no dorsal fin; flippers blunt; whitish ventrally, blotchy gray above.



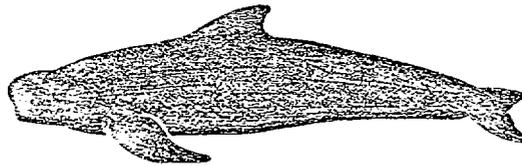
Risso's Dolphin
(*Grampus griseus*)
Status: Rare, Gulf of
Alaska.

L: to 4 m; steep, rounded forehead w/almost no beak; flippers long, narrow, falcate; large dorsal fin ahead of mid back; 2 to 7 prs teeth in lower jaw only; color gray to gray-black; head sometimes whitish.



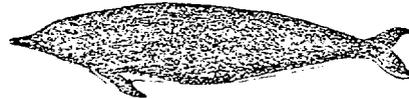
Killer Whale
(*Orcinus orca*)
Status: Common. North
Pacific, Bering &
Chukchi.

L: to 8.5 m; robust w/ prominent, high dorsal fin; 10 to 14 prs of conical teeth in upper and in lower jaw; large rounded flippers; white blotch by eye; yellowish to grayish band behind dorsal fin.



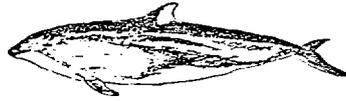
Pacific Pilot Whale
(*Globicephala sicki*)
Status: Uncommon,
North Pacific.

L: to 5.4 m; bulbous forehead w/ no beak; 7 to 15 prs of teeth in upper and in lower jaw; body chunky, all black above, some white midventrally; prominent low dorsal fin; long, lanceolate flippers.



Right Whale Dolphin
(*Lissodelphis borealis*)
Status: Rare, South
eastern waters.

L: to 2.5 m; short, slender snout; 40 to 50 prs of teeth in upper and in lower jaw; very slender caudal region; no dorsal fin; long, slender flippers; all black above w/ white ventral stripe.



White-sided Dolphin
(*Lagenorhynchus obliquidens*)
Status: Uncommon.
S.E. waters and Gulf of Alaska.

L: to 2.3 m; rounded forehead w/no beak; about 30 prs of teeth in upper and in lower jaw; large, hooked dorsal fin; lanceolate flippers; white below w/blotch & stripe pattern above.



Doll's Porpoise
(*Phocoenoides dalli*)
Status: Common, North Pacific & S. Bering.

L: to 2.1 m; sloping snout w/no beak; 25 prs of tiny teeth in upper and in lower jaw; large dorsal fin w/white, hooked t.p and prominent dorsal hump in caudal region, contrasting black & white color pattern.



Harbor Porpoise
(*Phocoena phocoena*)
Status: Common, all waters.

L: to 1.8 m; blunt snout; 20 to 30 prs of tiny, spatulate teeth in upper and in lower jaw; triangular dorsal fin; pale below, slaty to blackish above w/ black stripe from corner of mouth to flipper.

APPENDIX III
SOME KNOWN OR POTENTIAL PATHOLOGICAL
CONDITIONS IN MARINE MAMMALS OF
ALASKAN WATERS

Condition	Associated Agent(s)	Kinds of Marine Mammals Affected
<i>Inflammatory Reactions:</i>		
Dento-alveolar abscess	(?)	Sea otter, pinnipeds, toothed whales
Irritation of nasal mucosa	Nasal mites	Sea otter, pinnipeds
Tonsillitis	(?)	Any
Submeningeal hemorrhage, focal necrosis	Helminths	Whales
Dermatitis	Ectoparasites, fungi	Any
San Miguel sea lion disease	Virus	Gray whale, fur seal, sea lion
Pox	Virus	Pinnipeds
Muscular inflammation	Helminths, bacteria, broken bones	Any
Focal necrosis of muscles, blubber	Helminths, bacteria	Any
Myocardial infarct	Helminths	Whales, pinnipeds
Pneumonia, tracheitis, bronchitis, pulmonary granuloma, hepatization	Helminths, bacteria inhalation of foreign materials	Any

Condition	Associated Agent(s)	Kinds of Marine Mammals Affected
Inflammation and fibrosis of subpleural parenchyma	Helminths	Whales
Gastric lesions, ulcers, cysts	Helminths	Any
Hepatic cirrhosis, necrosis, hemorrhage	Helminths, bacteria	Any
Biliary fibrosis	Helminths	Any
Hemorrhagic enteritis, enterocolitis	Helminths, bacteria	Any
Osteoarthritis	{?}	Any
<i>Neoplasms:</i>		
Fibroma, papilloma of skin, tongue	{?}	Whales*
Neurofibroma, ganglioneuroma, basal lipoma	{?}	Whales*
Hemangioma (liver)	{?}	Whales*
Fibrosarcoma (kidney)	{?}	Pinnipeds*
Malignant granuloma (lymph nodes)	{?}	Whales*
Fibromyomata of uterus	{?}	Whales*
Mucinous cystadenoma (ovary)	{?}	Whales*
<i>Trauma:</i>		
Lamprey scars (circular)	Lampreys	Whales

Condition	Associated Agent(s)	Kinds of Marine Mammals Affected
Mandibular fracture	(?)	Whales, pinnipeds
Bullet holes	Man	Any
Crushing	Other, larger pinnipeds	Young pinnipeds
Lacerations	Predators, conspecifics	Any
<i>Other:</i>		
Asphyxia	Nasal mites, conspecifics	Pinnipeds, sea otter
Starvation	Food scarcity, gut obstruction, dental deficiencies	Any
Congenital deformities	—	Any
Arteriosclerosis	(?)	Whales*
Atherosclerosis	(?)	Whales'
Non-inflammatory hepatic focal necrosis, siderosis	(?)	Whales"
Portal and caval thrombi	Helminths	Whales*
Premature birth	Virus, bacteria, trauma	Pinnipeds*
Hemorrhagic anemia	Helminths (gut)	Pinnipeds*
Walled abscesses (in muscles, liver, abdominal cavity)	(?)	Whales*

*Reported only from this group but conceivably could occur in others.