



CCAC guidelines on:
the care and use
of marine mammals



Canadian Council on Animal Care
Conseil canadien de protection des animaux

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Dr. Mark Torchia
Chair of the CCAC Board of Directors

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the care and use of marine mammals

1 PREFACE

The Canadian Council on Animal Care (CCAC) is the national peer review agency responsible for setting and maintaining standards for the ethical use and care of animals in science throughout Canada. The CCAC publishes guidelines on the general care and use of animals in science, as well as on issues of current and emerging concern. The *CCAC guidelines on: the care and use of marine mammals* aims to provide information for investigators, animal care committees (ACCs), facility managers, veterinarians and animal care staff that will assist in improving both the care given to marine mammals and the manner in which experimental procedures are carried out. This guidelines document replaces Chapter XVII – Marine Mammals, *Guide to the Care and Use of Experimental Animals*, vol. 2 (CCAC, 1984).

The *CCAC guidelines on: the care and use of marine mammals* is based on the *Recommendations for the Care and Maintenance of Marine Mammals*, which is intended for all Canadian institutions that house marine mammals. The *Recommendations for the Care and Maintenance of Marine Mammals* was developed by a subcommittee of individuals with a range of expertise related to the care and maintenance of marine mammals. This CCAC guidelines document captures the information that is relevant to the CCAC Program, and provides context that is specific to the care and use of animals in science.

Meeting the many needs of marine mammals in captivity in terms of housing, nutrition, health care and other factors that may affect their quality of life, requires a team approach, involving the ACC, management, animal care personnel, veterinary personnel, and investigators. This document seeks to foster an interdisciplinary approach, as no single discipline encompasses all the knowledge required to adequately address the animals' needs.

Concerns regarding the maintenance of marine mammals relate to the ability of institutions to ensure an acceptable quality of life for the animals in their care. The quality of life of an animal has been described in terms of an interaction of three components: biological functioning, affective states, and relatively natu-

ral life (Fraser and Weary, 2004), as described in Section 7.1 Quality of Life. If marine mammals are to be maintained in institutions, these three components should be considered in relation to the facilities and husbandry regimes of the animals, in order to create environments that positively affect their quality of life.

These guidelines are intended to provide assistance in the implementation of Russell and Burch's Three Rs (replacement, reduction and refinement) for animals used in science (Russell and Burch, 1959). The practices described are based on a combination of scientific evidence and expert opinion, which have been subject to peer review. These practices are constantly evolving and attention to this field should result in continual improvement in animal welfare.

Throughout this document, the term 'should' is used to indicate an obligation, for which any exceptions must be justified to, and approved by, an ACC. The term 'must' is used for mandatory requirements.

Complete species-specific recommendations are not provided in these guidelines, and institutions are expected to consult experts to obtain more detailed information concerning housing and husbandry needs.

SUMMARY OF THE GUIDELINES LISTED IN THIS DOCUMENT

2. GENERAL CONSIDERATIONS

Guideline 1:

The use of animals for scientific purposes should be justified in terms of the contribution to the understanding of biological principles or to outcomes that can be expected to benefit humans, animals or ecosystems. Evaluation of proposals must attest to the potential value of studies involving marine mammals.

Section 2.3 Ethics, p. 12

Guideline 2:

An institution planning to acquire a new marine mammal should make all efforts to acquire the animal from existing captive populations.

Section 2.3 Ethics, p. 13

Guideline 3:

Institutions that hold marine mammals must make every effort to maintain the physical and psychological health of those animals.

Section 2.3 Ethics, p. 13

Guideline 4:

Institutions where marine mammals are held must have an established animal care committee.

Section 2.4.1 Responsibilities of the animal care committee, p. 13

Guideline 5:

Each institution must have access to a qualified, licensed veterinarian with expertise in marine mammal medicine, who oversees a program of preventive veterinary medicine and clinical care for all marine mammals held in the institution, in accordance with professional standards of practice.

Section 2.4.2 Responsibilities of the institution and facility management, p. 14

Guideline 6:

Institutions should provide programs for the professional development of animal care personnel, as well as the continuing education of veterinarians and other professionals.

Section 2.4.2 Responsibilities of the institution and facility management, p. 15

Guideline 7:

Each institution must have a comprehensive record keeping system.

Section 2.4.2 Responsibilities of the institution and facility management, p. 15

Guideline 8:

The primary responsibilities of animal care personnel should be to maintain and enhance the welfare of the animals in their care.

Section 2.4.4 Responsibilities of animal care staff, p. 16

Guideline 9:

Investigators using marine mammals must prepare detailed protocols describing the proposed use of marine mammals for research, and submit their protocols to the research administration for arms-length scientific merit review (unless funded by a peer-review granting agency) and to the ACC for ethical and practical review and approval.

Section 2.4.5 Responsibilities of investigators, p. 16

3. FACILITIES

Guideline 10:

Enclosure design must take into account the natural behaviour of the species to be housed, and incorporate features that will positively affect the welfare of the animal.

Section 3.2 Enclosure Design, p. 18

Guideline 11:

Consideration must be given at the outset to the three-dimensional environment in which marine mammals live and the need to provide sufficient space for species-appropriate activities both in and out of the water.

Section 3.2.1 Spatial requirements of enclosures, p. 18

Guideline 12:

Pre-parturient and lactating females should be held in appropriate social environments within enclosures that encourage successful rearing of offspring.

Section 3.2.1.4 Areas for breeding and rearing of offspring, p. 19

Guideline 13:

In addition to a pool of water, pinnipeds and sea otters must have permanent access to a haul-out.

Section 3.2.2 Haul-outs, p. 20

Guideline 14:

Marine mammals must be protected from exposure to noise that could cause auditory discomfort or distress and lead to injury.

Section 3.2.3 Acoustics, p. 20

Guideline 15:

Animal enclosures must be structurally sound, designed to facilitate cleaning, and constructed to minimize injury to the animals.

Section 3.2.5 Structural considerations, p. 21

Guideline 16:

Pools must have drains that lower water levels sufficiently to facilitate cleaning and other management activities.

Section 3.2.7 Drainage, p. 22

Guideline 17:

Gates and net dividers should be designed and maintained to prevent physical injury and entanglement of marine mammals and facility personnel.

Section 3.2.8 Nets and gates, p. 22

Guideline 18:

The water supply must be reliable and contribute to the good health of the marine mammals.

Section 3.3.1 Water supply, p. 23

Guideline 19:

Circulation of water should occur throughout the entire pool.

Section 3.3.2 Water circulation and hydrodynamics, p. 24

Guideline 20:

The perimeter security of institutions must be designed to prevent escape of housed animals and access by unwanted animals and people, as well as prevent objects from being thrown into marine mammal enclosures.

Section 3.6 Security, p. 27

4. FACILITY MANAGEMENT, OPERATION AND MAINTENANCE

Guideline 21:

To ensure optimal water quality, a program must be in place for monitoring select physical, chemical, and biological parameters of water that are associated with maintenance of a healthy aquatic environment.

Section 4.2.1 Water quality, p. 28

Guideline 22:

The salinity of the water should be maintained within the range appropriate for the species.

Section 4.2.3 Salinity, p. 29

Guideline 23:

Introduction and propagation of microorganisms (viruses, bacteria, fungi and parasites) within marine mammal pools should be minimized.

Section 4.2.4 Micro-organisms, p. 29

Guideline 24:

Marine mammals should be housed in enclosures that provide environmental temperature and humidity ranges appropriate for the species.

Section 4.2.5 Temperature and humidity, p. 30

Guideline 25:

Plans must be in place and actions must be implemented to protect animals from weather conditions that could be detrimental to their health.

Section 4.2.6 Weather conditions, p. 30

Guideline 26:

Enclosure air must be free of harmful concentrations of pollutants.

Section 4.2.7 Air quality, p. 31

Guideline 27:

Each institution should have a Standard Operating Procedure detailing who is authorized to enter the facilities and any conditions on such entry.

Section 4.8 Access, p. 33

Guideline 28:

Each institution must have written plans to deal with emergency scenarios that would potentially threaten the safety and well-being of marine mammals and personnel.

Section 4.9 Emergency and Contingency Plans, p. 33

Guideline 29:

Facilities must have an occupational health and safety program that is designed to prevent injuries and occupational diseases. Buildings, structures, pools, machinery, equipment and workplaces must be maintained in such a condition that staff and marine mammals will not be endangered.

Section 4.10 General Safety, p. 33

5. ACQUISITION AND DISPOSITION

Guideline 30:

Each institution must have written protocols that provide justification for all marine mammals housed in the institution, as approved by the ACC.

Section 5.1 Acquisition and Disposition of Animals, p. 35

Guideline 31:

Institutions should properly manage any reproduction of marine mammals, as approved by the ACC, taking into account the age and health of the animals, housing conditions for the newborn, surplus animal issues, genetics, and the potential for a successful breeding outcome.

Section 5.2 Reproduction, p. 35

Guideline 32:

Prior to any capture, the institution must ensure there is an approved protocol and a formal, written capture plan, developed in consultation with the facility manager, a veterinarian (preferably with marine mammal experience), biologist, and/or personnel familiar with the wild population (e.g., aboriginal peoples, hunters, or Fisheries Officers).

Section 5.3 Capture, p. 36

Guideline 33:

For planned, directed capture in Canadian waters, DFO, appropriate management boards, and First Nations communities, when appropriate, must be consulted early in the planning process to ensure Canadian requirements are being met.

Section 5.3 Capture, p. 36

Guideline 34:

Directed capture must follow best practices to ensure the well-being of both the individual animals and the population.

Section 5.3 Capture, p. 37

Guideline 35:

A DFO licence must be obtained for the release of animals into the wild, and any released animal should be marked to facilitate subsequent identification and monitoring.

Section 5.4 Release of Animals to the Wild, p. 37

Guideline 36:

When release of a marine mammal that has been held in captivity is being considered, behavioural and medical assessment must be carried out to determine whether the animal is suitable for release.

Section 5.4 Release of Animals to the Wild, p. 38

6. TRANSPORTATION

Guideline 37:

All transportation of marine mammals must be well planned and documented in a detailed transportation plan approved by the ACC and veterinarian prior to transport.

Section 6.1 Transportation Plan, p. 39

Guideline 38:

The transportation plan and applicable licences must accompany the marine mammals during transport.

Section 6.1 Transportation Plan, p. 40

Guideline 39:

A marine mammal should only be transported if it is fit for the intended journey. Sick or injured marine mammals may only be transported if the veterinarian has determined that it is absolutely necessary for their health or safety.

Section 6.2 Fitness of Marine Mammals for Transport, p. 40

Guideline 40:

The safest and most expedient method of transportation should be used.

Section 6.3 Method of Transportation, p. 40

Guideline 41:

The International Air Transport Association (IATA) *Live Animal Regulations* must be met for air transportation of marine mammals, and should be used as a guide for land transportation.

Section 6.4 Containers, p. 41

Guideline 42:

All marine mammals should be accompanied by one or more attendants who are competent and knowledgeable in the transportation of that species.

Section 6.6 Transport Attendants, p. 41

7. HUSBANDRY

Guideline 43:

Institutions housing marine mammals must give careful attention to the quality of life of the animals and address their social and behavioural requirements throughout the duration that they are held, as the interests and activities of the animals may change with age.

Section 7.1 Quality of Life, p. 45

Guideline 44:

The basic elements of daily care must include careful observation of each marine mammal and careful recording of each animal's appearance and behaviour, including food intake.

Section 7.2 Daily Care and Maintenance, p. 46

Guideline 45:

Effective communications should be established among animal care staff, research team members and veterinarians to provide continuity of information transfer and the timely transfer of critical information.

Section 7.2 Daily Care and Maintenance, p. 47

Guideline 46:

Each animal must be individually identifiable and have a corresponding identification number.

Section 7.3.1 Identification of animals, p. 47

Guideline 47:

Each facility should have Standard Operating Procedures for all routine interactions with, and care of, the animals to the satisfaction of the ACC.

Section 7.4 Standard Operating Procedures (SOPs), p. 48

Guideline 48:

The diet provided for marine mammals must include a sufficient range of high quality foods to accommodate individual preferences and any changes in the availability of particular types of fish or other food items. Food quality must be assured through routine analysis.

Section 7.6.1 Nutrition, p. 49

Guideline 49:

Vitamin supplementation should be designed to meet each individual marine mammal's needs, as determined by a veterinarian or marine mammal expert.

Section 7.6.1.1 Supplements, p. 49

Guideline 50:

Food inventories must be managed and properly stored to ensure the availability of good quality food that meets the nutritional needs of the animals.

Section 7.6.3 Food storage, p. 50

Guideline 51:

Food must be handled, thawed, and prepared in a manner that ensures uniform thawing and preservation of nutritional value.

Section 7.6.4 Food handling, thawing, and preparation , p. 51

Guideline 52:

Any precipitous or unexpected change in appetite must be brought to the veterinarian's attention immediately.

Section 7.6.5 Feeding, p. 52

Guideline 53:

Food can be served as a reward, but not withheld as a punishment. Food deprivation must not be used as a method of training marine mammals.

Section 7.6.6 Food as reward, p. 52

Guideline 54:

Effective methods of physical restraint, that minimize the possibility of physical injury and stress to the animal while maximizing human safety, should be chosen.

Section 7.7.2.1 Physical restraint, p. 52

Guideline 55:

Each institution should have the ability to quarantine any newly-acquired animals and isolate, for medical reasons, any marine mammal housed in the institution.

Section 7.9 Quarantine and Isolation, p. 55

Guideline 56:

Each institution should have the ability to separate any marine mammal for behavioural or management purposes.

Section 7.10 Behavioural or Management Separation, p. 56

Guideline 57:

An institution that houses breeding marine mammals or that may obtain young animals should develop species-specific hand-rearing protocols.

Section 7.11.3 Care of young, p. 57

8. ANIMAL HEALTH CARE

Guideline 58:

Institutions housing marine mammals must have a written veterinary care program. This should be developed by a veterinarian in collaboration with other experts (e.g., marine mammal biologists).

Section 8.1 Veterinary Program, p. 58

Guideline 59:

Where appropriate, animal training should be used to facilitate care and control of the animals for medical purposes.

Section 8.1 Veterinary Program, p. 58

Guideline 60:

A program of preventative health care must include a complete annual physical examination for each marine mammal, establishment of diets specific to each animal, and regular oral examinations and treatment of dental problems.

Section 8.2 Preventative Health Care, p. 59

Guideline 61:

The veterinarian is responsible for all surgical procedures and must approve all pre-operative and post-operative procedures.

Section 8.3.2 Animal surgery procedures, p. 60

Guideline 62:

Animal care staff should be familiar with signs of common diseases of marine mammal species under their care, as well as the significance and procedures to ensure proper treatment of those diseases under the veterinarian's guidance and responsibility.

Section 8.4 Pathogens, p. 61

Guideline 63:

A complete veterinary post mortem examination should be performed on any marine mammal that dies in captivity.

Section 8.5 Mortality and Euthanasia, p. 61

Guideline 64:

Each institution must have a policy on euthanasia, approved by the ACC.

Section 8.5 Mortality and Euthanasia, p. 62

2 GENERAL CONSIDERATIONS

2.1 Applicability

For the purposes of these guidelines, marine mammals include all members of the Order Cetacea (whales, dolphins and porpoises), the Order Sirenia (manatees and dugongs) and, within the Order Carnivora, the Family Phocidae (true seals), the Family Otariidae (eared seals and sea lions), the Family Odobendiae (walrus), and the Sea Otter (*Enhydra lutris*). Polar bears (*Ursus maritimus*) are specifically excluded from these guidelines as they most closely resemble other members of the family Ursidae (bears) in terms of anatomy, physiology and behaviour. For developing best practices for facilities maintaining polar bears in captivity, the Manitoba *Polar Bear Protection Regulation* (Government of Manitoba, 2002) provides useful information.

The guidelines do not apply to marine mammals restrained for the shortest time possible for scientific work. This is covered in the *CCAC guidelines on: the care and use of wildlife* (CCAC, 2003a).

2.2 Definition of Institutions, Facilities and Enclosures

An institution is a stand-alone administrative unit, responsible for its own animal care and use program, and having or being able to secure the resources and elements necessary to structure and operate its animal care and use program according to CCAC standards, under the guidance of a senior administrator designated by the institution to be responsible for animal care and use. A marine mammal facility refers only to those components of an institution that house marine mammals, such as enclosures (i.e. pools or pens in which marine mammals are housed), areas for food preparation and medical treatment, and other areas related to the care and use of the animals.

2.3 Ethics

Guideline 1:

The use of animals for scientific purposes should be justified in terms of the contribution to the understanding of biological principles or to outcomes that can be expected to benefit humans, animals or ecosystems. Evaluation of proposals must attest to the potential value of studies involving marine mammals.

In line with the CCAC's approach to moral stewardship and respect for animal life (CCAC, 1999a), whenever investigators propose the use of animals in science, the CCAC requires that consideration be given to: 1) using alternative methods that do not involve the use of animals; 2) reducing the numbers of animals used, while maintaining the statistical power of the research data; and 3) minimizing any potential for pain and distress to be experienced by the animal and improving its welfare (CCAC, 1989).

The senior administration is responsible for ensuring that educational or scientific merit has been established prior to the ACC approving a corresponding animal use protocol from an ethical and practical viewpoint (see Section 2.4.1 Responsibilities of the animal care committee).

As with any research project involving animals, the investigator must provide evidence to the research administration that the proposed work has scientific merit through independent, expert peer review (see the *CCAC policy statement on: scientific merit and ethical review of animal-based research* (CCAC, 2013). In addition, the investigator must justify to the ACC how the experimental design and number of animals will answer the approved research question and how the proposed methods and care of the animals are in line with the Three Rs (see the *CCAC guidelines on: animal use protocol review* (CCAC, 1997)).

Research alone should not be used as an argument to maintain species that do poorly in captivity, or to maintain animals in facilities under suboptimal conditions. Indeed, husbandry under such conditions may compromise the study's results. A critical evaluation of the relevance and necessity of proposed research projects, with a thorough examination of alternatives and an assessment of the conditions under which the marine mammal is to be housed, is essential for the approval of research projects.

For any use of marine mammals for teaching purposes, the quality of the teaching protocol will determine whether substantial educational benefits are gained. These benefits can be difficult to demonstrate; therefore, a critical examination, including clear, measurable learning objectives and potential alternatives, is of the utmost importance for any proposed teaching protocols involving the use of marine mammals. Canada's Accredited Zoos and Aquariums' *CAZA Policy Re: Development and Evaluation of Educational Activities in Zoos and Aquariums* (CAZA, 2008) may be useful in developing teaching protocols and assessing their educational merit.

Guideline 2:

An institution planning to acquire a new marine mammal should make all efforts to acquire the animal from existing captive populations.

Guideline 3:

Institutions that hold marine mammals must make every effort to maintain the physical and psychological health of those animals.

Meeting the welfare needs of marine mammals in captivity requires appropriate facilities and a team approach involving the ACC, management, animal care personnel, veterinary personnel, and investigators. Sections 3 and 4 detail considerations for the design and maintenance of facilities, while Sections 7 and 8 provide information on husbandry and animal health care.

2.4 Responsibilities

2.4.1 Responsibilities of the animal care committee

Guideline 4:

Institutions where marine mammals are held must have an established animal care committee.

For smaller institutions, it may be difficult to establish an independent ACC, in which case a formal link with an ACC in another relevant institution should be established.

The institutional ACC is responsible for overseeing all aspects of the animal care and use program within its institution.

Written terms of reference for ACCs must be established by each institution housing marine mammals. The *CCAC policy statement on: terms of reference for animal care committees* (CCAC, 2006) may be adapted by institutions to address their specific requirements.

ACCs must report directly to the senior administrator responsible for the animal care and use program (see the *CCAC policy statement for: senior administrators responsible for animal care and use programs* (CCAC, 2008)).

2.4.2 Responsibilities of the institution and facility management

The senior administrator is responsible for ensuring: 1) appropriate facilities are in place for the species to be held; 2) sufficient veterinary and animal care staff, knowledgeable with regard to the species held, are available; and 3) a solid program is in place that fosters good communication between animal care staff, facility management, veterinarians, the ACC(s) and research and education personnel (see the *CCAC policy statement for: senior administrators responsible for animal care and use programs* (CCAC, 2008)). The senior administrator is also responsible for ensuring that any plans for the acquisition or disposition (release, euthanasia or transfer) of marine mammals meet the requirements of all applicable local, provincial/territorial, federal and international regulations and laws, and that applicable Fisheries and Oceans Canada (DFO) licences are obtained (see Appendix 1). For captures in Canadian waters, the requirements of Aboriginal treaties must also be respected.

Working with the facility manager, the senior administrator is responsible for ensuring that there are sufficient numbers of staff with the necessary skills to care for the animals and run all support systems at all times, and that skilled assistance is available in the event of an emergency. Personnel responsible for environmental control and monitoring must have appropriate training, access to technical expertise, and the resources and equipment necessary to evaluate and maintain the environmental parameters accurately. In addition, institutions should ensure that employees responsible for animal care and life support systems are designated as essential staff in the event of a labour dispute.

Guideline 5:

Each institution must have access to a qualified, licensed veterinarian with expertise in marine mammal medicine, who oversees a program of preventive veterinary medicine and clinical care for all marine mammals held in the institution, in accordance with professional standards of practice.

The availability of professional assistance from a veterinarian with expertise in marine mammal medicine is of prime importance in achieving and maintaining optimal conditions of care for marine mammals. The veterinarian should work with the ACC and contribute actively to other parts of the animal care and use program to ensure the welfare of the animals (see Section 2.4.3 Responsibilities of the veterinarian).

The responsibilities of the veterinary and facility management professionals should be reviewed by the senior administrator. Facility managers can report either to a veterinary director or to another senior administrator of the institution. Formal reporting lines should be in place that recognize responsibilities and are free of real or perceived conflict of interest.

Facility managers, the veterinarian(s) and the ACC are responsible for ensuring that SOPs for routine procedures (e.g., routine cleaning, blood sampling for routine health monitoring, or training procedures) are

current and applicable. SOPs to deal with emergency situations should be developed by the facility manager in consultation with the veterinarian, animal care staff and the ACC.

Guideline 6:

Institutions should provide programs for the professional development of animal care personnel, as well as the continuing education of veterinarians and other professionals.

All staff involved in animal care and maintenance should be competent in their duties and receive appropriate training as necessary (see Section 4.11 Staffing).

Guideline 7:

Each institution must have a comprehensive record keeping system.

Record keeping is an essential component of managing the health and well-being of marine mammals, and provides valuable information for facility management. Records must be kept for the facility, including water quality monitoring, and for the care and use of each individual animal (see Section 4.1 Facility Records, and Section 7.3 Record Keeping and Documentation).

Measures must be taken to ensure records are protected in case of disasters, including duplicate records retained in a separate location or a fire proof cabinet. Individual animal records should be retained on-site for at least five years beyond the life of the animal and permanently archived.

2.4.3 Responsibilities of the veterinarian

The principal veterinarian must report to the senior administrator responsible for animal care and use. The principal veterinarian should, as a minimum, demonstrate that she/he has ready access to appropriate expert resources outside the institution. Postgraduate training in zoo animal medicine is highly recommended. Professional development is necessary; this can include regular participation at specialized conferences and membership in professional associations focusing on zoo or aquatic animal medicine (e.g., the International Association for Aquatic Animal Medicine, www.iaaam.org).

Where the veterinarian is a consultant who may not be available to meet routine or emergency veterinary needs, a local veterinarian, who is competent to provide clinical services, must be readily available. In such cases, the consulting veterinarian must be available to provide advice to the local veterinarian.

In addition to the formal practice of medicine, the veterinarian:

- should contribute to the development of the institutional animal care policies and procedures;
- must ensure that the facility maintains adequate inventories of pharmaceuticals and routine medical equipment; and
- should provide advice on the maintenance, design and improvement of facilities; nutrition; reproduction; the enrichment program; and the psychological well-being of the animals, in consultation with other experts (including staff members) (see Canadian Association for Laboratory Animal Medicine *CALAM Standards of Veterinary Care* (CALAM/ACMAL, 2007)).

For research studies where the veterinarian is also the investigator, another veterinarian who has no real or perceived conflict of interest in the research should assess the welfare of the animal(s).

2.4.4 Responsibilities of animal care staff

Guideline 8:

The primary responsibilities of animal care personnel should be to maintain and enhance the welfare of the animals in their care.

Animal care personnel have daily contact with the animals and must be knowledgeable about the normal behavioural characteristics of the animals in their care. It is essential that they keep detailed and up-to-date records concerning each animal's activity level, appearance and appetite, and note and report to the facility manager and/or the veterinarian any abnormal behaviour exhibited by the animals as soon as possible.

Animal care personnel must ensure that food and nutritional supplements are of high quality and are stored, maintained and dispensed appropriately (see Section 7.6 Nutrition and Feeding Practices). Personnel responsible for giving food should recognize and record deviations from a normal state of good health in each individual animal, and report such deviations to the facility manager and veterinarian in a timely manner, as a change of eating habits may indicate a medical problem.

Animal care personnel must maintain a clean, healthy, and safe environment for the animals in their care at all times.

2.4.5 Responsibilities of investigators

Guideline 9:

Investigators using marine mammals must prepare detailed protocols describing the proposed use of marine mammals for research, and submit their protocols to the research administration for arms-length scientific merit review (unless funded by a peer-review granting agency) and to the ACC for ethical and practical review and approval.

Research protocols involving animals already held in an institution must be approved by an ACC prior to commencement of the work. For studies involving animals not currently held within an institution, approval by the ACC must be received prior to any acquisition of animals for the study.

3 FACILITIES

This section is intended to be used as a basis for designing and renovating an effective and functional marine mammal facility. Sections 3.1 to 3.6 outline the physical requirements of marine mammal facilities. See Section 4. Facility Management, Operation and Maintenance for details of the management, operation and maintenance of these facilities, including staffing requirements. Information on how marine mammals are to be managed and cared for within these facilities is provided in Section 7. Husbandry. Fundamental CCAC principles for animal facilities can be found in the *CCAC guidelines on: laboratory animal facilities – characteristics, design and development* (CCAC, 2003b).

3.1 New Facilities

New construction, starting with site selection, must consider potential detrimental impacts on the species to be housed. Factors to consider include, but are not limited to:

- potential adverse noise, unwanted water seeping or draining into the facility, and air pollutants;
- accessibility to good quality water;
- security for the animals and humans;
- ease of cleaning and disinfection without undue disturbance to the animals;
- ability to access incapacitated animals;
- access for medical treatment;
- ability to remove dead animals;
- ability to quarantine newly acquired and/or sick animals; and
- provision of refuge areas and shelter from adverse weather.

3.1.1 Open ocean enclosures

Open ocean enclosures must not be located near sewage or storm drains, industrial or municipal discharges, or freshwater outfalls. Open ocean enclosures require DFO approval and may require an environmental impact assessment.

3.2 Enclosure Design

Marine mammals have been held successfully in a number of enclosures that vary considerably from facility to facility. In general, most marine mammal enclosures will consist of a complex of pools with haul-out, dry rest, and activity areas incorporated as appropriate for each species. Typically, enclosures include a main or primary pool separated by movable barriers from one or more ancillary or secondary pools, including a holding or medical pool.

Planning and design of enclosures and incorporation of environmental features is under continual improvement. The size of the enclosure must be adequate and capable of housing compatible social groups as appropriate.

Guideline 10:

Enclosure design must take into account the natural behaviour of the species to be housed, and incorporate features that will positively affect the welfare of the animal.

The main consideration of enclosure design should be for the fundamental needs of the animals. Elements that positively affect the welfare of the animals should be incorporated into the enclosure design and surroundings, based on consultation with other institutions having similar facilities and species, and a review of the elements of the animal's natural habitat. The environment should provide diversity through enrichment programs and overall pool design (such as various depths and substrates), and provide shaded areas. Appropriate elements to incorporate will vary with species and the anticipated length of time the animals are to be maintained.

Variations in pool shape and other features (such as the presence of rocks and plants, as appropriate) can be used to address acoustic and other enrichment possibilities. Opportunities for exploring new forms of environmental enrichment (e.g., currents in pools with variable location, force and times; varied ambient sound; and seasonal temperature variation) should also be provided.

In addition to affecting the welfare of the animals, the adequacy of enclosures will also impact the quality of any scientific studies on the animals and the pedagogical value of any educational programs.

3.2.1 Spatial requirements of enclosures

Guideline 11:

Consideration must be given at the outset to the three-dimensional environment in which marine mammals live and the need to provide sufficient space for species-appropriate activities both in and out of the water.

Primary pools must provide sufficient space, both horizontally and vertically, so that the animal can make normal postural and social adjustments with adequate freedom of movement in or out of the water. Species-specific needs should dictate the size and architecture of the pool required to address the animal's physical, psychological and behavioural well-being. In-house experience and the experiences of other institutions should be considered in determining the best designs to meet these needs. The volume of space required to provide satisfactory housing for a particular marine mammal may vary depending on the quality of the animal's environment (see Section 7.1.1 Social and behavioural requirements).

The relationship between spatial, behavioural and enrichment requirements, and animal well-being has been interpreted differently by various organizations involved in standard setting (see Lien (1999) for a review of approaches to setting minimum standards by organizations in Canada, USA and UK). There is currently little consensus on appropriate minimum pool sizes internationally.

It is strongly recommended that institutions contemplating building new facilities or renovating existing facilities contact CAZA and the Alliance of Marine Mammal Parks and Aquariums (AMMPA) for their expertise in designing facilities for the maintenance of marine mammals.

3.2.1.1 Space to house social groups

As a minimum, each animal requires a social environment that will allow basic social contacts and positive social relationships. Facilities should be designed to maintain marine mammals in appropriate groups based on age, sex and breeding status, specific to each species (for example, see Waples and Gales, 2002).

3.2.1.2 Refuge areas

Refuge areas should be provided that allow marine mammals to isolate themselves from direct attention or disturbance. The refuge areas should be carefully designed based on the species, and configured to be inviting to the individuals housed.

3.2.1.3 Separation of incompatible animals

Sufficient space should be available in the facility to permit the transfer of one or several animals from any enclosure to another appropriate enclosure when necessary.

3.2.1.4 Areas for breeding and rearing of offspring

Guideline 12:

Pre-parturient and lactating females should be held in appropriate social environments within enclosures that encourage successful rearing of offspring.

For institutions intending to breed animals, enclosures must be available that address the spatial requirements of the animals and provide, if necessary, a means of separating the animals from others at the institution before birth and potentially for a prolonged period of rearing the offspring.

Maternity enclosures must be of a size and configuration that facilitate nursing and rearing of offspring. In the case of Otariids, the natural tendency for the dam to leave her pups for extended periods should be accommodated. For pinnipeds, the young should only have access to shallow water pools with easy access to a dry area until they are ready to swim.

3.2.1.5 Space for medical needs and quarantine

Ready access to the animals for hands-on physical examinations is essential. For marine mammals that live their entire lives in water, this can be facilitated through lifting bottoms or pools that drain quickly. There should also be adequate space in the facility to hold any animal if a pool must be drained.

Enclosures should be available to quarantine newly acquired or sick marine mammals to prevent the spread of infections to other animals in the facility through direct contact, fomite transmission, aerosol spread, waste drainage or re-use of untreated water (See Section 7.9 Quarantine and Isolation). Quarantine facilities may differ in size from primary pools; however, efforts must be made to provide a reasonable quality of life for the animals.

3.2.2 Haul-outs

Guideline 13:

In addition to a pool of water, pinnipeds and sea otters must have permanent access to a haul-out.

Species-specific requirements must be carefully considered when designing haul-outs. In some cases, more than one haul-out area will be needed to provide refuge and relief from dominant animals. Visual barriers may also be necessary. All individuals should be provided safe haven from other aggressive animals within the enclosure.

The resting areas must be large enough so that all animals in the pool can use them at the same time (e.g., during moulting). Appropriate surface drainage of haul-out areas must be provided, and surfaces should be easy to clean.

3.2.3 Acoustics

Guideline 14:

Marine mammals must be protected from exposure to noise that could cause auditory discomfort or distress and lead to injury.

Noise is a controllable pollutant that can be mitigated through abatement technology and appropriate equipment. Efforts must be made to protect marine mammals from exposure to harmful noise levels in both the air and water.

Given the importance of acoustics to marine mammals (Au and Hastings, 2008; Southall et al., 2007), the potential effects of underwater noise on captive marine mammals must be considered in facility design, especially for animals using sound in social communication and echolocation. Pool design, including the type and location of mechanical equipment and choice of pool materials, must aim to minimize noise over the large frequency band the animals are sensitive to, as well as vibrations and reverberations. All efforts should be made to isolate mechanical equipment. Pump rooms should be remotely located from enclosures, and where this is not possible, appropriate acoustical shielding and vibration mats should be used. Care should be taken to reduce the impact of noise during construction and maintenance work.

3.2.4 Lighting

Lighting must be appropriate for the health and well-being of the animals (including adequate light for routine health and hygiene checks, and for cleaning). Lighting considerations include the quality and intensity of the light, as well as its distribution and duration (photoperiod). Polar species appear to tolerate ambient cycles that differ from their natural environment without detriment to their health (Sweeney and Samansky, 1995). As far as possible, sunlight should be used as the primary source, and artificial light should be spectrally similar to sunlight. Glare from surfaces should also be taken into account when determining appropriate light levels.

3.2.4.1 Surface reflectivity

The colour of the pool should be carefully considered from the animals' perspectives, in particular for cetacean pools. Animals that spend extensive hours outdoors, especially around pools, have an increased

risk of damaging their eyes through UV exposure. Provision of shade over part of the pool, or painting the pool a less reflective colour (e.g., deeper blue or tan, rather than light blue) may be better for the eyes of the animals living in the pool (Gage, 2011).

3.2.5 Structural considerations

Guideline 15:

Animal enclosures must be structurally sound, designed to facilitate cleaning, and constructed to minimize injury to the animals.

Any enclosures or ancillary structures used for marine mammals must be designed to be capable of withstanding animal interactions and impact, and be durable in prevailing climatic conditions.

All enclosures, including sea pens and pools, must be constructed and maintained to ensure that animals housed in the facility are protected from injury and unable to escape, while unwanted animals are not able to enter. Bolts and items that can be dismantled must be tamper proof. Window caulking and sealants must be protected from tampering and be non-toxic.

For sea pens and pools, all sides of the enclosures should either be contained by dry land or have barrier fences that extend well above the water level at high tide and are resistant to ice damage. The height of the barrier should accommodate storm surges.

Any features incorporated or added to an enclosure must:

- be structurally sound;
- be designed to not trap or entangle the animals;
- contain no potentially harmful sharp edges, protrusions or abrasive surfaces that might cause physical trauma to the animals; and
- be built to allow effective cleaning.

Pool surfaces replicating natural environments, such as rubbing beaches, rock walls, sand or shell surfaces, are encouraged where they do not pose a health problem for the animals.

Overhead obstacles should be avoided, particularly with animals that may leap from the pools.

For species that climb or are capable of climbing, provision must be made to ensure that a fall from height is not possible and the enclosure is not scalable. This must also be considered for pool systems that drain with the animals in the pool.

3.2.6 Surfaces and finishes

All enclosure surfaces should be constructed of materials having a durable, non-toxic, non-porous, water-proof finish, which facilitate appropriate cleaning and disinfection to maintain water quality. These materials should be inert to prevent leaching contaminants that may be detrimental to the health of marine mammals (through either acute or chronic exposure). Materials susceptible to corrosion, especially from salt water, should not be used, particularly where corrosion can contaminate surfaces and the water and can weaken the structure. Materials that are not readily cleaned (e.g., wood and other porous products) should not be included in quarantine or other medical enclosures, unless they are safely disposable.

Newly constructed pools and life support systems must be conditioned before animals are introduced to ensure that building and coating materials are properly cured and there are no environmental, bacterial, chemical or toxicity concerns (e.g., leachates from fresh concrete or fumes of paints, epoxy and other products). Water parameters should be measured prior to the introduction of any animals.

3.2.7 Drainage

Guideline 16:

Pools must have drains that lower water levels sufficiently to facilitate cleaning and other management activities.

Adequate drainage must be provided in each pool and located so that all of the water in the pools can be rapidly emptied when necessary. Drainage should also be provided for haul-outs and areas immediately surrounding pools.

Drains should be constructed in such a manner that there is no possibility for animals to become trapped. All strainers, drainage covers and skimmer covers must be secure.

As noted in Section 3.2.5 Structural considerations, for species that are capable of climbing, enclosures must be designed so that they are not scalable when empty, and SOPs must be in place to ensure that a fall from the deck of the emptying enclosure is not possible.

The floor onto which an animal is lowered when an enclosure is drained should be safe for the animal and any animal care and veterinary staff that may be present.

3.2.8 Nets and gates

Guideline 17:

Gates and net dividers should be designed and maintained to prevent physical injury and entanglement of marine mammals and facility personnel.

Gates should have locks or mechanisms to prevent accidental opening or closing. Automatically closing gates should have mechanisms to prevent accidental crushing of marine mammals between gates and pool walls. Any automatically closing system should have a rapid and easy manual back-up in case of machinery failure.

Hydraulic gates should have a system in place to avoid spillage of hydraulic fluids into the marine mammal habitat. Some hydraulic systems can operate on vegetable oil, which is not toxic to the animals; however, care should still be taken as a spill of any oil could negatively affect the welfare of some animals (e.g., compromising the waterproofing and thermoregulation qualities of the fur of sea otters). In addition, oil can be problematic for filtration systems and has to be disposed of in an environmentally sound manner. Freshwater hydraulic systems are also in use at some facilities. Pneumatic gates are more environmentally friendly than the oil-based hydraulic gates and work well in the cold, but can be noisy.

Net dividers should have a mesh size appropriate for the safety of the species to ensure animals do not become entangled.

3.2.9 Power supply

Reliable and adequate sources of power must be provided to run life support systems and support facilities. The power supply should be adequate for temporary increases in demand for emergency purposes, and a suitable alternate source should be available when the primary source is interrupted. Enclosures should be designed to withstand electrical outages without creating welfare problems.

All electrical systems must be professionally installed to appropriate code standards (federal, provincial/territorial and municipal building codes) for operation in moist environments, and must include proper grounding and ground-fault interrupters on all circuits.

Life support systems must be equipped with a warning mechanism and a clear plan should be in place to inform designated staff when parameters fall outside of acceptable ranges (see Section 4.9 Emergency and Contingency Plans).

3.2.10 Landscaping

Landscaping should be carefully designed to ensure that the health of the marine mammals is not compromised. All planting should be contained to ensure that there is no possibility of soil run-off into the enclosure, even in heavy rains or flooding. Vegetation should not overhang enclosures. Care should be taken to ensure that leaves, needles and other plant material cannot enter the enclosure easily, especially in windy locations. Plant material is easily ingested and can cause gastro-intestinal problems, particularly in cetaceans. Many plant species are potentially toxic and a thorough review of the planned plantings should be conducted before installation.

3.3 Water

Marine mammals have been maintained in water of four generic types: seawater, artificial seawater (some or all of the major ions dissolved in freshwater), brines (sodium chloride dissolved in freshwater) and freshwater (see Section 4.2.3 Salinity). The science of water quality management and life support design is constantly evolving and institutions must work toward continual improvement of their water systems and procedures.

3.3.1 Water supply

Guideline 18:

The water supply must be reliable and contribute to the good health of the marine mammals.

Sufficient clean water is essential to the health and well-being of the animals. Contingency plans must be in place to quickly deal with any failure or fouling of the water supply that could adversely affect the animals.

Water systems maintaining marine mammals must have a reliable supply of salt water, or fresh water where appropriate, that is processed to minimize the accumulation of harmful bacteria, parasites and other pathogens, organic material, toxic chemicals and treatment agents. The system must also control the water temperature and flow appropriately for the species.

3.3.2 Water circulation and hydrodynamics

Guideline 19:

Circulation of water should occur throughout the entire pool.

The enclosures should be designed to ensure that there is full circulation of water throughout each pool to prevent accumulation of detritus and other substances that may be harmful to the animals. The circulation of water in medical or isolation pools should be capable of independent circulation from other pools. Water circulation in new pools should be checked prior to first use, and all pools should be checked regularly to ensure that full circulation is being achieved.

In systems employing point-contact sterilization (i.e. nonselective killing of microorganisms within a specific area of the pool (Spotte, 1991)), such as UV radiation and ozone, the rate of water circulation is critical. To reduce contaminants in the pool (food, urine and feces), the rate at which the sidestream is sterilized must exceed the rate of pool contamination (Spotte and Adams, 1981). UV and ozone sterilization of water require removal of organic material by filtration. Flow rates through sterilizing equipment are also critical to ensure appropriate contact time.

3.3.3 Water systems and processing

There is considerable variation in the design of water treatment systems, and the establishment of optimum water parameters should be based on the physiological needs of the animals and the effectiveness of the water processing techniques involved.

Water systems of marine mammal pools can be open (flow-through), closed or semi-closed. In open systems, water enters from a natural source or municipal line, passes through the pool and exits as waste water into a natural source or municipal sewage system. Open systems typically do not require mechanical filtration, but filters should normally be added to improve water clarity and reduce intake of fouling organisms or organic material.

Semi-closed systems rely on a lower replacement of pool water, typically less than 10% of the total volume per day. This low turnover necessitates both filtration and water treatment to maintain a healthy environment for the animals.

Closed systems require the most intensive water treatment since all of the water is reused or recirculated. Processes for sterilization, temperature control, removal of solids, and colour reduction are incorporated into the system design to maintain acceptable water quality. Water changes or additions are made as needed in closed systems (Spotte, 1991).

Pools used for medical isolation should be designed to allow water treatment independent of other pools.

Determining the most appropriate water system should involve consideration of biosecurity and the risk of disease introduction. For example, addition of new animals, or addition of animals from multiple sources or from the wild (which should be carefully controlled through appropriate quarantine measures, see Section 7.9 Quarantine and Isolation), leads to a higher risk of disease in resident animals if a single semi-closed or closed system is used throughout the facility.

Waste water discharge may be subject to regulations requiring permits and approvals. This may include, but is not limited to, volume restrictions, environmental contaminant restrictions, pre-treatment require-

ments and monitoring. Facilities must have SOPs and emergency protocols in place to meet the regulations so that the enclosure water is not compromised.

3.3.4 Water filtration

Mechanical filtration removes suspended gross particulate matter from the water. Typically in marine mammal pool design, this is achieved using high-rate pressure sand filters, although gravity sand filters, diatomaceous earth filters, rotating drum filters, bead filters and other types are also in use.

Microflocculation can be achieved using foam fractionators or protein skimmers. These filters use a stream of fine micro-bubbles which, when injected into contact chambers, collect and remove dissolved organic material.

3.3.5 Water treatment

To ensure the health of the animals, facilities using recirculation systems require some form of water treatment. While broad-spectrum methods of water treatment can be effective, the best approach requires awareness of the pathogens that are most probable to be encountered, and tailoring the treatment system to the highest known kill or control values for those pathogens, with appropriate measures to protect animal health (such as sidestream and strip approaches, as noted below).

Ozone, sodium hypochlorite, and UV radiation are the most common forms of treatment used in marine mammal pool waters. Any treatment must be used in a way that will not cause harm or discomfort to the animals or to the staff.

SOPs and sound physical, biological, and chemical life support system processes must be in place to ensure adequate disinfection of the water and prevent excessive treatment. The water in marine mammal pools should be tested at least twice daily for concentration of chlorine and/or other oxidizing agents.

Ozone is a preferred option for treating the water of marine mammal pools, and when used effectively, is capable of disinfection, odor control, oxidation of organic and inorganic contaminants, removal of organics in solution, color removal, turbidity reduction, and decreased chlorine demand. Ozone is a more powerful oxidant than chlorine. Marine mammal water systems are typically treated using sidestream ozonation, where only a percentage of the recirculating water is treated. No residual ozone is maintained in the marine mammal pools, as ozone should always be stripped from the water after treatment in the reactor. For human health and safety, ozone concentration in the air must be monitored in the area near the ozone generation equipment to meet Canadian standards for ozone use (http://www.ccme.ca/assets/pdf/pmozone_standard_e.pdf).

Chlorination has been a widely used technique for the breakdown of organic matter from marine mammal pools; however, the use of chlorine is complex and uninformed use can lead to chronic water quality problems. Chlorine reacts very differently in fresh versus salt water. In addition, the organic loading within the pool system must be carefully evaluated (see White, 1999 for information on calculating appropriate chlorine levels). Since chlorine is a bulk-fluid sterilizing agent (i.e. it is present in all parts of the water system), reaction products must be constantly monitored and controlled. Some species of marine mammals cannot tolerate even small amounts of chlorine; fur seals (NOAA, 2009) and sea otters, for example, are particularly prone to pelage damage at very low levels of chlorine. For these and other sensitive species, ozone may be a better choice.

Sterilizing agents such as UV can never actually sterilize pools due to the continuous input of microorganisms from the animals and other sources (Spotte, 1991). There are concerns that UV treatment cannot

process a large enough sidestream to adequately disinfect closed or semi-closed marine mammal systems (Spotte and Buck, 1981). UV radiation must be applied in very clear water (previously filtered) because particles in suspension compromise the efficiency of this treatment. Treatment with UV radiation requires significant electrical power and regular maintenance.

3.4 Support Facilities

The full range of activities involved in the maintenance of the facility must be considered in planning the support space required. Support facilities must include appropriate space for:

- mechanical equipment;
- safely storing cleaning supplies and equipment;
- meeting the needs of the staff;
- food preparation; and
- veterinary needs.

Well designed and maintained support facilities for all staff working with marine mammals are essential to the operation of the institution, and include:

- easily accessible change rooms with adequate locker space to store personal items;
- washbasins and lavatories to promote high standards of personal hygiene; and
- appropriately sized dry office or work space to conduct meetings, complete records or conduct other administrative duties.

Rest areas for staff breaks and meals should be available and be completely separated from the animal work areas.

A dedicated food preparation area, suited to the daily food requirements of the marine mammals being held, should be provided. The following requirements of the *Facilities Inspection Manual* from the Fish Inspection Program of the Canadian Food Inspection Agency (CFIA, 2008), which are intended for facilities processing fish for human consumption, should be followed:

- Floors, walls and ceilings should be constructed so that they will not be sources of contamination. They should be made of material that will allow cleaning and disinfecting (durable, seamless and non-porous), and of light colours that allow the evaluation of their cleanliness.
- Floors in wet working areas (processing, receiving and holding areas) must be of waterproof, non-absorbent, washable, and non-toxic materials, and should be non-slip. Floors in wet working areas must slope sufficiently for liquid to drain. A slope of 1 cm/m has been found to be adequate. If floors are ribbed or grooved to facilitate traction, the grooves should always run to the drainage channel. No water or waste should be allowed to collect or pool during processing. If floors in wet working areas are not adequately sloped, it must be demonstrated that they can be maintained in a clean and sanitary condition.
- Ceilings in processing, receiving and storage areas must be constructed of durable, smooth, waterproof and light-coloured materials, and must be well maintained. Ceilings may be constructed of wood if they are coated with an acceptable material that will prevent moisture from entering the wood. All surfaces must be constructed so as to facilitate cleaning and disinfecting, and joints sealed to prevent the entry of moisture. Suspended ceilings are permitted, provided that they can be maintained in a clean and sanitary condition (i.e. tiles should be clipped down and sealed).

All sinks and food preparation surfaces should be of non-porous, non-corrosive materials and of a design that facilitates effective sanitizing.

3.5 Animal Surgery / Veterinary Facilities

Veterinary support services should be provided with office and laboratory space appropriate to the objectives and size of the program. Institutions should have an on-site veterinary clinic or hospital, or a contract with a veterinary facility in close proximity to the institution in cases where an on-site clinic/hospital is not practical. Factors to be considered in determining the level of services that needs to be available on-site include the species being held, the type of transportation available, and the distance between the institution and an appropriate veterinary facility. Transportation of animals should be minimized. Even if an off-site veterinary hospital is used for surgical procedures, there should be an on-site area that can be used for minor treatment, minor surgical procedures, medical procedures on smaller marine mammals, and occasional or emergency aseptic surgical procedures. Such areas should be appropriately outfitted for physical and chemical restraint and proper disinfection and sanitation to minimize risks to the animals.

A dedicated space for post mortem examination should be provided, or post mortem examination should be contracted out. Post mortem examination areas should be designed to contain fluids and prevent exposure of other animals to potential pathogens. The area should be designed for ease of cleaning. The post mortem examination area should be beyond the sensory range of other animals.

For more information, see the *CCAC guidelines on: laboratory animal facilities – characteristics, design and development* (CCAC, 2003), sections C.3.3 Surgery and C.3.13 Necropsy.

3.6 Security

Guideline 20:

The perimeter security of institutions must be designed to prevent escape of housed animals and access by unwanted animals and people, as well as prevent objects from being thrown into marine mammal enclosures.

Security features to prevent intrusion by unauthorized persons or unwanted animals must be in place for all marine mammal facilities. Structural features, such as fencing of a suitable design (height, durability and strength), secondary electric perimeter fencing, security (video) cameras, infra-red motion detectors and locked doors, are possible security barriers. The choice of features should be based on the range of possible threats to the animals in the facility, including physical disturbance or injury, accidental or purposeful release from the facility, and introduction of a pathogen of concern, as well as the risk of injury to the intruder (animal or human).

Harassment from people outside the premises of the institution, including objects falling or being thrown into enclosures, should also be prevented. Barriers and deterrents are useful, as is education of the neighbours.

4 FACILITY MANAGEMENT, OPERATION AND MAINTENANCE

4.1 Facility Records

Facility records should include architectural drawings, permits, inspection reports, maintenance logs, records of all tests performed to measure environmental quality (see Section 4.2 Environmental Control and Monitoring) and records of chemical treatments. These records are kept for confirmation of the correct operation, filtration and disinfection of the water supply, and for medical purposes. Records of environmental parameters, including air quality and verifications of the HVAC system for indoor facilities, should be maintained on-site for at least five years.

4.2 Environmental Control and Monitoring

The quality of an animal's environment can have significant effects on its physical and behavioural health. Sensory input from temperature variation and changing photoperiod can serve to synchronize seasonal breeding or growth cycles, as well as influence diurnal hormonal rhythms, immune status, and basic metabolic state. Many marine mammal species demonstrate considerable plasticity in response to environmental extremes, whereas others are less tolerant to conditions outside their normal range. The environment must be designed to meet both the species- and group-specific needs, as well as the physical condition of the individual animals.

4.2.1 Water quality

Guideline 21:

To ensure optimal water quality, a program must be in place for monitoring select physical, chemical, and biological parameters of water that are associated with maintenance of a healthy aquatic environment.

Regardless of the reliability of the water source, routine testing is required. Tests to measure the chemical composition and presence of contaminants and biotoxins will determine the actions necessary to ensure the health of the marine mammals (see the following sections for recommendations concerning testing, as well as Section C.2 Water Quality in the *CCAC guidelines on: the care and use of fish in research, teaching and testing* (2005)). Seasonal factors, such as phytoplankton or zooplankton blooms, tidal cycles, seasonal water mass turnovers and lake turnovers, can have periodic effects (scales of hours, days or months) for both sea water and fresh water, and these need to be anticipated.

Water quality should be maintained by filtration, protein skimmers, chemical treatment or other means. Animal and food waste should be regularly removed to maintain water quality and pool hygiene, and to minimize contamination of other areas. Naturally occurring organisms that are present on pool structural surfaces and do not degrade water quality or pose a threat to animal health need not be removed.

Facilities should develop and follow a written SOP for cleaning enclosure surfaces using methods that are not hazardous to the animals.

4.2.2 pH

In untreated salt water systems, marine mammals have been managed safely over a range of pH values from 6.5 to 8.5 (Spotte, 1991). Within this range, there appears to be no direct effect of pH on marine mammal health; however, pH measurements can provide an indication of the chemical processes taking place in the water (Arkush, 2001).

For systems undergoing a variety of chemical treatments, the efficacy of the chemical processes can be affected by pH values. The pH should be checked and recorded at least daily, and evaluated and maintained in the context of the type of water treatment system being used.

4.2.3 Salinity

Guideline 22:

The salinity of the water should be maintained within the range appropriate for the species.

Most marine mammals should be kept in salt water that is within the salinity range normally encountered by the species in the wild, unless recommended otherwise (e.g., by the veterinarian for medical reasons or transportation). The salinity ranges should be approved by the veterinarian or a biologist experienced with the marine mammal species involved. Salinity should be monitored and recorded daily. For most cetacean species, the salinity of the enclosure should be ≥ 22 parts per thousand (Stamper, 2006).

Facilities not utilizing natural sea water should add sodium chloride, or a combination of sodium chloride and other naturally occurring sea salts, to the water to maintain the level of salinity appropriate for the species.

Freshwater is not recommended for Otariids as it may be a contributing factor in the development of corneal edema (Dunn et al., 1996, as cited in Arkush, 2001). However, fresh water is a suitable temporary alternative to salt water for transport of cetaceans, keeping the animals cool and wet when out of water, or for short-term holding of marine mammals (Arkush, 2001). Written justification for holding a marine mammal in freshwater for more than 48 hours must be entered into the animal's medical records.

4.2.4 Micro-organisms

Guideline 23:

Introduction and propagation of microorganisms (viruses, bacteria, fungi and parasites) within marine mammal pools should be minimized.

Monitoring the water systems for micro-organisms, in particular coliform bacteria, provides an indication of water quality. Water samples should be collected and tested weekly for coliform counts, which should not exceed a most probable number (MPN) of 1,000/100 ml (Arkush, 2001). Corrective action must be taken immediately for systems exceeding this number. Arkush (2001) provides an overview of water quality issues for marine mammals.

A program of daily facility cleaning and maintenance (including disinfection, filtration, dilution and monitoring, as appropriate) should be implemented to minimize the risk of animal exposure to pathogenic micro-organisms.

4.2.5 Temperature and humidity

Guideline 24:

Marine mammals should be housed in enclosures that provide environmental temperature and humidity ranges appropriate for the species.

Natural temperature ranges for the species should be used as a reference, considering individual and group differences. Some animals can tolerate a considerable range of temperatures, including temperatures outside of their normal range, while others cannot. Some species, such as the bottlenose dolphin, occupy a wide range of environmental conditions (e.g., water temperatures) in the wild, but all members of the species do not necessarily experience the full range. Temperature requirements should therefore take into account the environment (geographic area) of the stock from which the animals originated. When animals are to be held in temperatures that differ from their previous experience, a period of acclimatization may be recommended by the veterinarian.

Suitable temperature ranges for maintaining healthy marine mammals are primarily based on husbandry experience of zoos and aquariums (Arkush, 2001). A number of references for water temperature ranges are provided by Arkush (2001, p.780). Information for wild populations may also be obtained using seasonal sea temperature data from remote (satellite) or oceanographic monitoring stations where available.

For indoor facilities, air and water temperatures must be regulated to protect the marine mammals from temperature extremes. Rapid changes in air and water temperatures should be avoided, unless part of a veterinarian-approved program using temperature differentials to provide diversity and enhance the quality of the environment for the animals. Relative humidity in indoor facilities should also be controlled as part of microbiological control and for the comfort of animals and humans.

When using outdoor facilities, steps must be taken to ensure the air and water temperature ranges that may be encountered do not adversely affect the welfare of the marine mammals to be housed.

4.2.6 Weather conditions

Guideline 25:

Plans must be in place and actions must be implemented to protect animals from weather conditions that could be detrimental to their health.

Several species of marine mammals spend a considerable amount of time out of the water during certain times of the year; however, marine mammals should always have access to water for thermoregulation.

The amount of ice formation acceptable on pool surfaces depends on the species of marine mammal in the pool and the amount of open water remaining. The water surfaces of pools in all outdoor enclosures housing cold water species of pinnipeds should be kept sufficiently free of solid ice to allow for entry and exit of the animals at all times. The water surface of enclosures housing sea otters and most cetaceans should be kept free of ice; however, some ice is acceptable for narwhal and beluga.

Outdoor haul-out areas should include provision for both shade from, and access to, direct sunlight.

4.2.7 Air quality

Guideline 26:

Enclosure air must be free of harmful concentrations of pollutants.

Pollutants may be generated from a specific point source or from several sources over a wide area, and their detrimental effects may be acute or chronic. Potential sources of air pollution include chlorine gases, airborne particulates, building materials, cleaning agents, paint fumes and pesticides. Air pollutants should be controlled at the source to prevent the accumulation of harmful concentrations. Where this is not possible, and the levels are at potentially harmful concentrations, effective ventilation must be employed or the animals must be relocated to an alternate location. In indoor facilities, the HVAC system must be regularly checked to ensure that good quality air is being well distributed.

Care should be taken with any activity that contributes to airborne pollution in the vicinity of marine mammal enclosures. Cetaceans are particularly susceptible to pneumonia, and local construction or dust-causing activity may increase the risk of infection by specific pathogens (Dunn et al., 2001).

4.2.8 Sound

Each facility should monitor the acoustic environment. The noise levels the animals are exposed to should be measured over the whole acoustic frequency band that the particular species is sensitive to, and regularly monitored. Acoustic input of new operating equipment should be evaluated before it is introduced. Any concerns regarding the potential effects of sounds on the animals should be referred to an expert in acoustic measurement, in conjunction with a person having appropriate experience in estimating the sensitivity of the animals to recorded sound levels. See Section 3.2.3 Acoustics.

4.3 Facility Maintenance

Facilities should be maintained to a standard that ensures the well-being of the animals. Facilities should have a regularly scheduled preventive maintenance program for all life support systems, and an annual maintenance program for all other equipment, structures and surfaces. The day-to-day operation of the facility, such as scheduled sanitation measures and environmental monitoring and control, should be conducted in a standard fashion. The development of SOPs for management of facilities ensures consistency.

4.3.1 Enclosure maintenance and sanitation

Buildings, grounds, walls and barriers must be kept in good repair. Regular checks should be made to ensure primary enclosures housing marine mammals do not have any loose objects, sharp projections or edges which may cause injury or trauma to the marine mammals.

There must be a maintenance program for gate channels to keep them free of debris, toxic substances and pathogens. Net dividers should be in good repair and well maintained. A schedule of visual inspections by divers or through pool draining should be implemented.

All surfaces must be maintained in good repair as part of a regular, ongoing maintenance program. Institutions should implement SOPs for routine and major cleaning to ensure that surfaces do not constitute a health hazard to the animals.

The inclusion of furniture, equipment or decorations in the enclosures should be evaluated in terms of potential impact on the animals and how effectively they can be cleaned and maintained.

Animal and food waste, trash, or debris that enters marine mammal enclosures must be removed as often as necessary to maintain proper water quality, to minimize health and disease hazards to the marine mammals, and to avoid attracting nuisance animals.

The wall and bottom surfaces of marine mammal pools must be cleaned as often as necessary to maintain proper water quality. Natural organisms (e.g., algae, coelenterates or molluscs) that do not degrade water quality, prevent proper maintenance, or pose a health or disease hazard to the animals are not considered biological contaminants.

Precautions must be taken to prevent any foreign materials from entering the pools. Pools should be thoroughly and continually monitored. Rain or snowmelt that would normally soak into the ground may carry soil bacteria and pathogens into the pool water if it flows over impervious surfaces such as haul-outs.

4.3.2 Food preparation area sanitation

Food preparation facilities should be appropriately cleaned and disinfected; bacterial contamination of all equipment and surfaces must be prevented. Food preparation surfaces should be sanitized immediately following food preparation, and floors should be sanitized at least daily. Utensils and containers should be cleaned and sanitized regularly as needed.

4.4 Nuisance Animals

A safe and effective program for the control of nuisance invertebrate, avian and mammalian animals must be established and maintained. Insecticides or other such chemical agents must not be applied in primary enclosures housing marine mammals, except when deemed essential by the veterinarian. If insecticides or other chemicals are used, the animals should be removed from the area during decontamination due to the toxic nature of many of these agents.

4.5 Waste Handling

Animal and food wastes, dead animals, trash, debris and any wastewater from the enclosures must be efficiently removed and disposed of according to relevant regulations. Disposal facilities should be provided and operated in a manner that minimizes the presence of nuisance animals, odours and disease hazards. An evaluation of where drains are discharged is necessary, and drainage materials may need decontamination, especially from medical and quarantine areas.

Waste disposal and drainage procedures must comply with all applicable federal, provincial/territorial and local laws pertaining to pollution control, protection of the environment and public health.

4.6 Machinery, Equipment and Maintenance

Machinery and equipment used in marine mammal facilities must be capable of safely performing the functions for which they are intended. The installation, inspection, testing, operation, repair and maintenance of the machinery and equipment must be carried out by trained personnel in accordance with the manufacturers' recommendations and instructions, and as specified by a professional engineer. Facilities must have a written equipment maintenance program, and all maintenance activities must be recorded in an equipment log.

4.7 Chemicals and Biocontaminants

Staff must be trained in the safe handling, use, storage, monitoring, control and disposal of any chemical or biological substance which could adversely affect the health of a marine mammal or staff at the facility, and must follow applicable SOPs. This includes emergency and clean-up procedures. For information on chemicals used in water treatment, see Section 3.3.5

Biocontainment SOPs should be implemented to prevent transmission of animal or human diseases to any animal with potential to be released to the wild, where populations or species at risk may become infected.

4.8 Access

Guideline 27:

Each institution should have a Standard Operating Procedure detailing who is authorized to enter the facilities and any conditions on such entry.

4.9 Emergency and Contingency Plans

Guideline 28:

Each institution must have written plans to deal with emergency scenarios that would potentially threaten the safety and well-being of marine mammals and personnel.

Emergency scenarios include, but are not limited to, power and water supply interruptions, accidents involving humans or animals, fire, equipment failures, natural disasters (including blooms of toxic algae), vandalism, terrorism, labour disputes, and financial difficulties. Facilities must have written emergency plans that detail courses of action for all such emergencies. Providing a safe environment for staff during an emergency is a priority.

Facilities must have a specific written emergency plan to provide a safe environment for each marine mammal without endangering staff. Life support systems for the marine mammals must be maintained in the case of power failure. As a minimum, back-up life support systems must be available for the length of time it would require staff to rectify the problem or relocate the marine mammals. Measures to maintain a reliable and safe food supply for each animal must be in place.

Animal and facility records must be protected from fire, flooding and other hazards. Duplicate records must be retained in a separate location or a fire proof cabinet.

4.10 General Safety

Guideline 29:

Facilities must have an occupational health and safety program that is designed to prevent injuries and occupational diseases. Buildings, structures, pools, machinery, equipment and workplaces must be maintained in such a condition that staff and marine mammals will not be endangered.

A safety training program for staff should be provided. Responsibility for in-house staff training should be clearly defined and records of training must be appropriately maintained.

Appropriate safety equipment should be readily accessible to those working in and around animal enclosures.

4.11 Staffing

Animal care is a continuous and daily responsibility, and this should be emphasized to all concerned. Basic animal care must be categorized as an essential service (as noted in Section 2.4.2 Responsibilities of the institution and facility management).

The staff must be composed of an adequate number of competent employees to ensure the practices specified in these guidelines are performed effectively at all times. Staff members should work under the direction of a supervisor with demonstrable experience in marine mammal husbandry and care, in collaboration with the veterinarian where the veterinarian is not the supervisor. Staff should only be assigned responsibilities commensurate with their experience, formal training, and mentoring provided by the facility manager.

Sufficient staff must be available for weekends and holidays, and skilled assistance must be available or on call 24 hours a day in the event of an emergency. It should be recognized that routine-orientated animals may not respond well to changes in personnel, feeding and cleaning schedules.

All animal care staff should be drilled in their responsibilities in case of emergency situations (such as fire, unauthorized entry by a member of the public, injury to a person or animal, etc.). Drills should be performed at least twice per year to ensure staff members are aware of their roles in emergencies and to ensure SOPs continue to address these situations appropriately.

Personnel involved in the use of captive marine mammals for scientific purposes must have attained an acceptable level of competency prior to being permitted to work with the animals (see the *CCAC guidelines on: institutional animal user training* and *Recommended Syllabus for an Institutional Animal User Training Program* (CCAC, 1999a,b)).

5 ACQUISITION AND DISPOSITION

5.1 Acquisition and Disposition of Animals

Guideline 30:

Each institution must have written protocols that provide justification for all marine mammals housed in the institution, as approved by the ACC.

Institutions must ensure that the numbers and species of marine mammals held correspond to ACC-approved protocols and are appropriate for the scientific goals, the size and condition of the facility, and the social and behavioural needs of the animals.

The institution must have the necessary resources to provide the professional care and management required to meet the physical and social needs of any animals being acquired. Animal acquisition should only be approved if it will not jeopardize the welfare of either the animals already being held by the institution or the animal being acquired.

Consideration should be given to the physical and physiological consequences of transportation, and the social and psychological consequences of moving animals from one social grouping to another. This includes considerations of the stress on the relocated animal and also on the affected social groups which will have lost or gained an individual (Dierauf, 1990; Laule and Desmond, 1991).

Disposition occurs when an animal is released (see Section 5.4 Release of Animals to the Wild), transferred to another institution, dies or is euthanized. Release includes both return and reintroduction to the wild. Transfer to another institution may be temporary or for a longer term, for purposes such as to provide housing while a facility is undergoing construction. Institutions must ensure that animals are not transferred to individuals or organizations that lack the appropriate expertise and facilities to care for them.

The welfare of individual animals and the conservation of populations, species and ecosystems must be carefully considered during acquisition and disposition activities. This may include an environmental impact assessment in the case of release of captive animals.

Records of all transactions involving acquisition and disposition of animals to and from the institution must be maintained, and must include the terms of the transaction.

5.2 Reproduction

Guideline 31:

Institutions should properly manage any reproduction of marine mammals, as approved by the ACC, taking into account the age and health of the animals, housing conditions for the newborn, surplus animal issues, genetics, and the potential for a successful breeding outcome.

Institutions should maintain active breeding populations only when there is a documented strategy to manage the breeding program and facilities are available to appropriately house animals throughout the pregnancy, birth, and rearing of the offspring (see Section 7.11 Breeding Management).

To maintain stable groups in appropriate facilities, steps to prevent reproduction may be necessary.

5.3 Capture

Capture from the wild should only occur in exceptional circumstances. A licence from DFO is required for capture of marine mammals in Canadian waters.

Capture is intuitively very stressful for marine mammals (Curry, 1999; Reilly et al., 2002). Consideration should always be given to acquisition of animals bred in captivity. Where capture is under consideration, an assessment should be made of the potential impact of capture on the wild population (Reeves et al., 2003) and the ability of the species to survive under captive maintenance, based on expert knowledge and experience from previous captures. Consultation with other facilities is an important part of this process.

Guideline 32:

Prior to any capture, the institution must ensure there is an approved protocol and a formal, written capture plan, developed in consultation with the facility manager, a veterinarian (preferably with marine mammal experience), biologist, and/or personnel familiar with the wild population (e.g., aboriginal peoples, hunters, or Fisheries Officers).

Planning the capture of marine mammals should involve consideration for the safety and well-being of the individual animals and the social groupings, as well as that of capture personnel. Due diligence, appropriate training in the techniques to be used, and the involvement of expert handling personnel, familiar with the species in question and the geographical area, are essential (see Small and DeMaster, 1995; Thompson and Geraci, 1986). The personnel involved must be familiar with the species of interest and its response to disturbance, as well as its sensitivity to capture and restraint.

Capture methods vary with the species, social organization and conservation status; the local conditions; and the age, health and reproductive status of the individual animals. Prior to capture, the various capture techniques should be reviewed to ensure that the approach used is effective and suited to the species and situation, will minimize distress and injury to the animals, and will minimize capture of non-target animals.

The capture plan must be reviewed and approved by the institution's ACC as part of a formal animal use protocol. The plan must include emergency procedures to deal with events such as injury or death of the animal during or immediately following capture.

Guideline 33:

For planned, directed capture in Canadian waters, DFO, appropriate management boards, and First Nations communities, when appropriate, must be consulted early in the planning process to ensure Canadian requirements are being met.

DFO capture licences for marine mammals, except for those captured during emergency rescue circumstances, normally have specific requirements. In recent captures of cetaceans, DFO has required the pres-

ence of an independent observer, and recommended videotaping of the operation. These videos may also be beneficial for training purposes to help improve any future captures.

Although DFO is not responsible for captures outside of Canada and their importation into Canada, the institutional ACC needs to approve of them in formal protocols before they are undertaken. DFO should be contacted when such captures are planned. Directed captures outside of Canada should meet standard capture licence requirements for comparable species in Canada, if available, including assurance of documentation allowing peer review, as well as any relevant regulations pertaining to the jurisdiction where the capture occurs (see *CCAC guidelines on: the care and use of wildlife* (CCAC, 2003a) and the *Marine Mammal Regulations* (Department of Justice, 2011)).

Guideline 34:

Directed capture must follow best practices to ensure the well-being of both the individual animals and the population.

When a capture is authorized, the operation must be coordinated in a manner that follows the capture, restraint and transportation requirements stated in the capture permit. Additional guidelines in the *CCAC guidelines on: the care and use of wildlife* (CCAC, 2003a) should be followed.

5.4 Release of Animals to the Wild

In general, it is not appropriate to release marine mammals that have been held in captivity to the wild. Before release of any marine mammals held or bred in captivity is considered, the potential negative effects on the ecological conditions at the release site, on the individual animal, and on human safety must all be considered and minimized.

The risk to the wild population should be the primary concern (see the *IUCN Position Statement on Translocation of Living Organisms* (IUCN, 1987)). Release should not occur if an environmental impact assessment of the release area indicates potential negative consequences, including the risk of introducing a pathogen to the area. See Measures (2004) for a discussion of the risk of pathogen introductions.

Guideline 35:

A DFO licence must be obtained for the release of animals into the wild, and any released animal should be marked to facilitate subsequent identification and monitoring.

The ultimate decision concerning release of a marine mammal to Canadian waters is the responsibility of DFO. The information provided here describes best practices to be followed when DFO has determined that release is permissible.

Prior to release of a marine mammal, it should be marked using a method that will provide individual identification over a long term (See Section 7.3.1 Identification of animals).

Guideline 36:

When release of a marine mammal that has been held in captivity is being considered, behavioural and medical assessment must be carried out to determine whether the animal is suitable for release.

Release should not occur if the animal is unlikely to survive in the wild. Captive animals are exposed to environmental conditions that differ from their natural habitat and that may change the animal's constitution (e.g., its ability to thermoregulate or respond to other environmental cues). Exposure to competitors, predators, pathogens and other factors of natural selection are minimized in captivity.

When release is determined to be appropriate, a detailed protocol for release must be approved by the ACC, and by DFO if the release is to be into Canadian waters. The protocol should contain plans to monitor the released marine mammal to maximize the opportunity for survival in the wild or through rescue if needed. Such monitoring could also contribute to the body of knowledge relating to releases.

For best practices in releasing marine mammals, see NOAA (2009) and the *CCAC guidelines on: the care and use of wildlife*, Section H.3 Translocation and Release (CCAC, 2003a).

6 TRANSPORTATION

Transportation refers to the transfer or transport of a marine mammal from one location to another utilizing a carrier or conveyance system. Typically during transportation, an animal will not have access to its normal aquatic environment that provides physical support, temperature control, and freedom of movement.

Transporting marine mammals poses many challenges. It is recommended that anyone planning to transport marine mammals should consult experts prior to shipping (for example, the Alliance of Marine Mammal Parks and Aquariums) for up-to-date expertise and methodologies to ensure the health of the animals.

6.1 Transportation Plan

Guideline 37:

All transportation of marine mammals must be well planned and documented in a detailed transportation plan approved by the ACC and veterinarian prior to transport.

The transport plan should ensure that best practices are followed and must include details of pre-trip treatment and care, transport, and contingency plans in case of possible emergencies. The plan should also describe follow-up monitoring of the animal.

Facility management should coordinate personnel and resources to ensure that each marine mammal is properly prepared for transportation and cared for both during and after transit.

Communications with carriers of marine mammals must emphasize the need for the crew to be informed of the presence of the marine mammal on board the vehicle, the specific temperature and ventilation requirements, and the necessity of informing the individual accompanying the marine mammal of any unexpected delays as soon as the likelihood of such delays becomes known. Plans should be made with the carrier for access to the animal by the shipper or authorized representative, barring safety concerns, or for other necessary actions to be taken to ensure the well-being of the animal if delays occur.

Prior to transport of marine mammals, the shipper must confirm that the animal holding areas of the terminal facility or intermediate handler:

- are kept clean and sanitized to prevent debris or excreta accumulation, disease hazards, and the introduction of nuisance animals, and have established procedures for the control of nuisance animals (invertebrates, birds and mammals); and
- provide fresh air within the temperature range specified by the veterinarian, by means of windows, doors, vents or air conditioning in a manner that minimizes drafts, odours, and moisture condensation, with the capacity to measure the air temperature outside the primary container upon arrival and every 30 minutes thereafter (measurement should be at a distance of 1m from the container and at half the height of the container).

Guideline 38:

The transportation plan and applicable licences must accompany the marine mammals during transport.

A transport licence is needed to move marine mammals between provinces or territories (see Sections 15 and 16 under the *Marine Mammal Regulations* of the Fisheries Act (Department of Justice, 2011)). A transfer licence is required to move marine mammals within provinces or territories (see Section 56 under the *Fishery (General) Regulations* (Department of Justice, 2013)).

6.2 Fitness of Marine Mammals for Transport

Guideline 39:

A marine mammal should only be transported if it is fit for the intended journey. Sick or injured marine mammals may only be transported if the veterinarian has determined that it is absolutely necessary for their health or safety.

For transportations between institutions, a veterinary health assessment must be conducted on each animal to be transported within ten days preceding transport. A written health certificate must be prepared by the veterinarian, based on a physical examination and an evaluation of behavioural, feeding and medical records. The certificate must accompany the animal.

6.3 Method of Transportation

Guideline 40:

The safest and most expedient method of transportation should be used.

Transportation must be safe and should minimize stress, with the greatest importance being placed on the well-being of the animals. Time in transit for shipping marine mammals should be kept to a minimum. Transportation of marine mammals must always use best transport practices, based on consultation with appropriate experts and adherence to International Air Transport Association (IATA) *Live Animal Regulations (LAR)* (IATA, 2012).

IATA provides information on how to ship live animals safely, including minimum requirements for the international transport of domestic and wild animals. The regulations manual includes a list of the precautions airlines, shippers, cargo agents and animal care professionals should take on the ground and in the air.

The World Organisation for Animal Health (Office International des Épizooties (OIE)) *Transport of Animals by Sea* (OIE, 2012a) and *Transport of Animals by Land* (OIE, 2012b) should be consulted where the IATA *Live Animals Regulations* is not applicable.

6.4 Containers

Guideline 41:

The International Air Transport Association (IATA) *Live Animal Regulations* must be met for air transportation of marine mammals, and should be used as a guide for land transportation.

In general, primary transport containers should:

- be constructed from materials sufficiently strong to contain the marine mammals and withstand the normal rigours of transportation;
- be constructed from non-toxic, durable materials that cannot be chewed or swallowed;
- be constructed of materials designed to minimize potential abrasions to the marine mammal's skin;
- have interiors which are free from any openings or protrusions that could injure the animals;
- be easy to sanitize;
- be constructed so that no parts of the contained marine mammals are exposed to the outside of the containers;
- have openings with locking devices that make the animals easily accessible at all times for emergency removal or treatment;
- have air inlets on each side of the containers at heights suitable for cross ventilation, making up no less than 25% of the total surface area of the sides;
- have projecting rims to provide air circulation space between the containers and any adjacent cargo or conveyance wall; and
- have adequate handholds or other devices on the exterior to facilitate lifting without unnecessary tilting, and to ensure that the persons handling the containers do not come into contact with the animals.

6.5 Preparation of the Animals for Transport

Most marine mammals should be fasted for at least 24 hours prior to transport (Antrim and McBain, 2001), depending on veterinary advice. Sea otters are an important exception and should not be fasted prior to transport (see Section 6.8.3 Sea otters).

Animals should not be presented for shipment more than 4 hours prior to scheduled departure of the primary conveyance to minimize total transit time.

6.6 Transport Attendants

Guideline 42:

All marine mammals should be accompanied by one or more attendants who are competent and knowledgeable in the transportation of that species.

Requirements for all attendants who accompany marine mammals during transportation include:

- ability to recognize signs of stress in the animal and their causes, and how to reduce these;
- ability to recognize an animal which is ill or becomes unfit for transport; and
- skill in the treatment of injuries, when and how to administer veterinary drugs (when and where permitted) and when and how to immobilize an animal if necessary.

Additionally, attendants accompanying marine mammals for air transport require the following:

- knowledge of the appropriate handling and care of animals during loading, takeoff, flight, landing, and unloading, and any restrictions on animal care staff; and
- working knowledge of aircraft and airport operations and procedures.

Further requirements when international travel is involved include:

- knowledge of the animal health and welfare regulations and document requirements applicable to the countries of origin, transit (if any) and destination; and
- a current and valid passport, with any required visas.

A veterinarian should accompany all cetacean transports.

It is acceptable for pinnipeds to be transported by commercial carriers where it is not possible to have an attendant present in the commercial vehicle. However, detailed requirements for animal health, such as temperature range, access to water, emergency contacts, etc., must be included in the transport documentation. It is particularly important that essential information regarding the environmental conditions for the animals is conveyed to the flight crew.

6.7 Care of Animals During Transport

Containers should not include mixed species of animals. Particular attention should be given to ensuring that the containers provide adequate ventilation for the animals because overheating can become a serious problem during transport.

Containers must be properly secured at all times. All loading and unloading of animals should ensure the safety of the animals and the handlers.

The animal's skin or fur should be moistened as often as necessary and appropriate for the species, to prevent dehydration and to assist thermoregulation. Animals which require drinking water must be offered water at suitable intervals. Most marine mammals are not exposed to fresh water in their natural environment and may refuse to drink even if dehydrated.

Marine mammals should not be moved from their primary container except under extreme emergency conditions, and then only by the accompanying expert or other individual who is capable of handling such animals safely. Marine mammals should not be confined in shipping containers for more than 24 hours without a health check.

During air transportation, cabin pressure and temperature should be maintained at levels suitable for the marine mammals.

6.8 Species Considerations

6.8.1 Cetaceans

Cetaceans should not be fed for 24 hours prior to transportation to minimize regurgitation and the accumulation of waste products in the transport container (Antrim and McBain, 2001).

Water-filled boxes should be used for cetacean transport except in emergencies. Transportation of small cetaceans held in fabric stretchers and suspended in large freshwater-filled boxes provides a good approximation of the near weightlessness of these animals in water.

Containers for cetaceans should allow for adequate freedom of movement of the flippers at all times and permit the adjustment of the animal's position without leading to injury. Stretchers should have extra openings at the level of the animals' genital opening and at the level of the eyes, and have appropriate cushioning at sites of possible friction. The stretcher used should be based on the measurements of each individual animal.

Adjustments in the position of the cetaceans during transport should be made when necessary to prevent necrosis of the skin at weight pressure points. Animals should be kept calm to avoid struggling, thrashing or other unnecessary activity which may cause overheating or physical trauma.

The water in which the animal is held during transport should be maintained at a temperature near that of the environment from which the animal came, cooled with ice if necessary (Antrim and McBain, 2001). Cetacean skin must be kept moist by regular spraying to permit normal thermoregulation. Non-toxic emollients are useful where friction is likely to occur, and may be necessary during unprotected exposure to very cold air. All necessary equipment and supplies for maintaining the animal's appropriate temperature should be available.

When transporting cetaceans in aircraft, the shipper should ensure that the cabin pressure will be maintained at less than 1,800 meters; 1,463 meters or less is optimal for most individuals.

6.8.2 Pinnipeds

Pinnipeds tolerate long periods out of the water, provided they are kept cool and/or moist (Antrim and McBain, 2001). Pinnipeds should not be fed for 24 hours prior to transport and should not be given food during transport (Antrim and McBain, 2001).

The container must be of sufficient internal size to allow the pinniped room to make positional changes, e.g., turn completely around and stand in a normal position without obstruction. The diagonal of the container floor must be sufficient to allow the animal to lie outstretched.

Temperatures during transport should be monitored to prevent either hypothermia or hyperthermia.

6.8.3 Sea otters

Sea otters have high metabolism and need to be fed before and approximately every 2 hours during transport (Antrim and McBain, 2001) or as advised by the veterinarian. An adequate supply of refrigerated food must be available.

Sea otters are sensitive to overheating during transport and need to be able to maintain contact between their paws and water or ice for thermoregulation (Antrim and McBain, 2001). The cage should be large

enough to allow the sea otter to effectively groom, turn around and lie outstretched. The fur of the animal is important for thermoregulation, and the sea otter should be able to groom itself throughout transport. A layer of ice should be placed on an elevated draining cage floor to provide fresh water and cooling (Antrim and McBain, 2001). A refillable hand sprayer is an effective way to help cool a warm animal and will also help to keep its coat clean.

Air temperature should not exceed 15.5°C (Tuomi, 2001), but animals can be transported in most conditions with competent people on hand to adjust the animals' environment. Exposure of sea otters to direct sunlight can cause overheating; shade must be provided throughout transport without impeding good ventilation.

Cages should have mesh side panels to permit good ventilation and unobstructed observation (Antrim and McBain, 2001). Providing a removable perforated floor above a watertight cage bottom will permit the animal to remain separate from uneaten food, feces, urine and water. Waste should be emptied during transport to prevent animals from soiling their fur (Antrim and McBain, 2001).

When transporting sea otters in aircraft, cabin pressure should be maintained at less than 1,800 meters, with 1,463 meters or less being optimal for most individuals.

7 HUSBANDRY

7.1 Quality of Life

Guideline 43:

Institutions housing marine mammals must give careful attention to the quality of life of the animals and address their social and behavioural requirements throughout the duration that they are held, as the interests and activities of the animals may change with age.

Well-being in animals has two components: physical and behavioural (CCAC, 1990). Physical well-being is manifested by a state of clinical health (see Section 8. Animal Health Care). Behavioural well-being is manifested by behaviour considered to be normal for that species, together with the absence of abnormal behaviour. Animals of some species are held for many years and their interests and activities may change with age.

Well-being has been described in terms of environmental comfort, freedom from pain and distress, freedom to express natural behaviours, and appropriate social interactions (CALAM/ACMAL, 2007). These characteristics, developed for evaluating the appropriateness of housing and husbandry of farm animals (see the UK Farm Animal Welfare Council's *Five Freedoms* (FAWC, n.d.)) should be considered in the evaluation of the appropriateness of husbandry of marine mammals.

Three complementary strategies have been suggested by animal welfare scientists to provide environments that meet the animals' needs (Fraser and Weary, 2004):

- *Relatively natural lives* attempts to accommodate key elements of natural behaviour, including social organization and interaction (i.e. animals should be able to carry out normal patterns of behaviour including normal affiliation with other animals in an environment that is well suited to the species).
- *Biological functioning* attempts to provide environments that promote good health, growth, reproduction and longevity (i.e. animals should be well fed and housed, free from injury and disease, and relatively free from the adverse consequences of stress).
- *Affective states* attempts to provide environments that animals prefer (i.e. animals should be relatively free from negative states including pain, fear, discomfort and distress, and capable of experiencing normal pleasures and comforts).

The strategies outlined above are not mutually exclusive. Husbandry practices should be designed to include a combination that best suits the species, based on current practical experience and veterinary and scientific knowledge. However, it is recognized that key elements of natural behaviour for some species may be poorly described in the scientific literature. Additionally, some behaviours expressed in the wild may not need to be expressed in captivity, for example escape from predators, migration to feeding areas, and response to adverse climatic conditions (McBain, 1999).

Environmental enrichment is a term used to refer to provision of stimulating and responsive environments (Shepherdson, 1998) above the basic conditions which meet the animal's physical, physiological and psychological needs. The animals' responses to any forms of enrichment should be evaluated.

7.1.1 Social and behavioural requirements

Animals held in institutions should be maintained in social and physical situations conducive to providing adequate exercise, social and environmental stimulation (including sensory stimulation), and diversity of daily activity appropriate to each species. Improvements to the physical environment may include space and temperature (e.g., introduction of ice, different pools with different temperatures, etc.). The social environment should be appropriate for the individual, group, and species, with respect to group size, sex ratio, age ratio, potential for aggression, breeding, and species-appropriate behaviour. Species-specific characteristics should be addressed appropriately with respect to feeding behaviour and ecology, social behaviour, cognitive abilities, natural range/space, type of locomotion, territoriality, and inter-species contact. The individual animal's behaviour also needs to be considered with respect to rearing history, physical fitness, atypical species-specific behaviour, and food preferences. Sufficient resources should be available to provide short-term and long-term means of improving the quality of life for the animals.

Programs to encourage expression of normal species-specific behaviours can be an effective way to encourage activity, investigative play and social interaction among marine mammal groups. Novelty in exercise or play objects, as well as opportunities for marine mammals to view human activities, can be introduced to provide enrichment. Feeding practices can also provide enrichment through introduction of novelty or live food; however, with live food, consideration should be given to the possibility of parasite transmission, the appropriateness for the situation, and ethics concerning the use of live food. Training itself may be an important part of improving the quality of life for these animals (Shepherdson, 1998).

Any object in the enclosure, other than food or ice, must be sufficiently large so that it is not ingestible, and sufficiently strong so that it is not readily breakable or likely to cause injury to marine mammals. Objects must be easily cleaned and disinfected effectively.

Undertaken on a regular basis, ethograms of individual marine mammals or groups can be an effective tool in the early recognition and correction of undesirable behavioural patterns or health problems. Husbandry staff trained to implement such techniques of objective observation bring added benefit to the care of the animals.

Each institution should have an ongoing planning process for improving the environment in which marine mammals are held, and each aspect of enrichment stimuli should be evaluated. Means of improving the quality of life for captive marine mammals are constantly evolving, and institutions must make efforts to follow new developments.

7.2 Daily Care and Maintenance

Guideline 44:

The basic elements of daily care must include careful observation of each marine mammal and careful recording of each animal's appearance and behaviour, including food intake.

Animal care personnel are the first line of defense in any health care program. Through daily interaction with the animals, they develop the ability to recognize subtle changes in behaviour, appetite and motiva-

tion. Often such observation skills are critical in recognizing early stages of disease, prompting rapid and successful treatment.

Consistency in the close observation of the animals cannot be overemphasized. More than one staff member should be assigned to care for each animal so the absence of a staff member does not interfere with an animal's routine.

Guideline 45:

Effective communications should be established among animal care staff, research team members and veterinarians to provide continuity of information transfer and the timely transfer of critical information.

Clearly defined communication pathways are an important part of an animal health care program. Delays in animal treatment or procedural changes can be avoided through a clearly understood plan. The ACC should also receive regular communications (see Section 7.4 Standard Operating Procedures (SOPs)).

7.3 Record Keeping and Documentation

Good, well-defined record keeping and reporting are essential for the continued well-being of animals maintained in captivity. Animal records should include information such as birth date and location, parentage, acquisition information, diet, appetite, clinical exams, medical history (diagnosis and treatment), morphometrics such as weight, specific identification marks, behavioural observations, breeding history, enclosure history, disposition information, post mortem examination reports, information on training, and participation in research or educational projects. Complete records of all animals must be maintained by the institution.

A clear record of efforts to improve the animals' quality of life should be maintained, and institutions should share their results with other institutions. Documents should be retained for five years.

7.3.1 Identification of animals

Guideline 46:

Each animal must be individually identifiable and have a corresponding identification number.

The least invasive method of marking (if required at all) should be used, consistent with reliable, rapid identification. Physically distinct morphological marks, flipper tags, microchips, tattoos, and genetic profiles are some of the methods applicable in identifying marine mammals. The use of physical marks requires photographic documentation to ensure that the animals can be recognized over time.

7.3.2 Records of animal health

Daily health monitoring records should include observations of food intake and the animal's general condition and behaviour. The frequency of monitoring other parameters (e.g., haematology, blood chemistry, hormonal analysis and vaccinations) is at the discretion of the veterinarian, and will depend on the species, the individual animal, the program and the physical facilities. Monitoring may also occur opportunistically

when other procedures are necessary. Records of such monitoring should be kept to assist in developing a normal baseline for the animal.

Daily feeding records should be kept for all individual animals and must include type or species of food and supplements, and quantity fed. Individual feeding records should also include determination of appetite. Feeding records should be maintained for group-fed colonies of marine mammals where individual rations are not practical or feasible to maintain. Feeding records must be available for animal care staff and the veterinarian.

Records must also be kept of fish lots or batches. This includes laboratory analysis of nutritional value, which typically involves measurements of moisture, fat, protein, ash, carbohydrates, energy value, trace metals, peroxide, bacteria culture, and food storage details.

Health records should always remain in the institution where the animal resides; however, copies should be kept in the institution(s) where the animal was previously housed.

7.3.3 Training records

Any training of animals should be recorded, with notes describing the behaviour of each animal involved.

7.4 Standard Operating Procedures (SOPs)

Guideline 47:

Each facility should have Standard Operating Procedures for all routine interactions with, and care of, the animals to the satisfaction of the ACC.

SOPs for husbandry should be appropriate to the facility and organizational reporting structure, and include details of how concerns regarding animal health, behaviour and well-being are to be effectively communicated to the veterinarian. See Sections 2.4.1 Responsibilities of the animal care committee, and 2.4.2 Responsibilities of the institution and facility management, for information on the development of SOPs.

7.5 Housing

Marine mammals that are gregarious by nature should be housed with at least one compatible animal of the same or a closely related species, unless knowledgeable personnel (e.g., veterinarian, biologist, etc.) determine that this arrangement is not appropriate for the animal. Appropriate social grouping is very important for cetaceans; their dynamics are essential for mental and physical health (McBain, 1999). Cetaceans should therefore be kept with conspecifics or a closely related compatible species. Some pinnipeds, however, do not form stable social units. Pinniped interactions can be aggressive and related to maintaining inter-animal spacing or to courting and mating. Animals should not be housed with or near other animals when such aggression causes stress or discomfort, or otherwise adversely affects the well-being of the animal.

Care is required to ensure the social groups remain compatible and reflective of the social units found in the wild, as group structure may change according to life cycle and season. When a marine mammal is held alone, written justification must be completed by the veterinarian and retained in the permanent animal health records.

Temporary holding enclosures for animals that are maintained in isolation for medical treatment, training, research or other situations requiring special attention must be adequate, so as not to cause discomfort to the animal being housed. Long-term holding of animals in isolation pools is generally not acceptable.

7.6 Nutrition and Feeding Practices

Formulation of marine mammal diets should be overseen by knowledgeable personnel (e.g., veterinarian, animal nutritionist, biologist, etc.) having experience with marine mammals. Facility managers, animal care personnel and veterinarians should be well versed in marine mammal nutrition. Animal care personnel are ultimately responsible for ensuring that food and nutritional supplements are of high quality and are appropriately stored, maintained and dispensed.

7.6.1 Nutrition

Guideline 48:

The diet provided for marine mammals must include a sufficient range of high quality foods to accommodate individual preferences and any changes in the availability of particular types of fish or other food items. Food quality must be assured through routine analysis.

Marine mammals' nutritional needs should be met through a diet which takes into account species-specific requirements, observation of natural mass gain/loss cycles, and prevention of obesity. Each food species has different nutritive characteristics and caloric density which may vary seasonally (see Worthy, 2001). It is important to know the caloric content of each food species at different times of the year.

Only the finest quality (human quality) marine products should be purchased as feed. Marine mammals depend on the moisture content of their food for hydration, and should be fed whole fish. Cut fish should be prepared immediately before feeding and include all parts of the fish; any remaining cut fish following a feeding should be discarded.

It is important to prevent habituating an animal to a single food item in case of availability problems. Furthermore, it is generally easier to provide a balanced diet with multiple food items.

7.6.1.1 Supplements

Guideline 49:

Vitamin supplementation should be designed to meet each individual marine mammal's needs, as determined by a veterinarian or marine mammal expert.

Vitamin and mineral deficiencies may lead to serious health problems and must be avoided through careful food storage and handling, provision of an appropriate diet for the individual, and supplementation of some nutrients. In particular, frozen fish is poor in B-complex vitamins (including B1) and Retinol (vitamin A).

Supplemental nutrients should be carefully placed in a fish species that the animal is used to eating. Care should be taken to ensure each animal receives the supplements intended for it. For information on specific supplements (e.g., vitamins A, B1, B-complex, C, D and E, and salt), see Worthy (2001).

Vitamins should generally be administered approximately 1.5 hours before the first main feeding session, and preferably in one or two lean fishes (no fatty fish) to diminish the destruction of vitamin B by the thiaminase present in many fish species.

Supplements must not be used beyond the expiration dates listed on the labels.

7.6.2 Inspection of food shipments

Experienced staff should be responsible for conducting inspections of food fish upon arrival. Visual inspection before a delivery of food fish is accepted should include checking for the following:

- signs that the fish have been frozen repeatedly (e.g., ice build-up on the boxes or on the truck floor);
- an acceptable reading on the temperature gauge of the vehicle;
- any undesirable items that could affect the quality of the fish that have been shipped within the same truck; and
- the shipment fulfills the order in terms of fish species, quantity, specific fishing period, package size, etc. (Crissey, 1998).

7.6.3 Food storage

Guideline 50:

Food inventories must be managed and properly stored to ensure the availability of good quality food that meets the nutritional needs of the animals.

The inventory of fish should be managed to avoid both shortage and excessively long storage times. Records detailing food quality and analysis should be maintained on-site, as stated in Section 7.3.2 Records of animal health.

Food must not be used beyond the commonly accepted shelf-life unless tested to ensure nutritional value and safety for human consumption. Shelf-life depends primarily on the type of fish (lean fish have longer shelf-life than fat fish) and on how the food has been handled and processed. Each type of food has a different shelf-life and storage requirements (Worthy, 2001). Vitamins and minerals are abundant in whole fresh fish; however, their concentrations can be markedly affected by storage and handling procedures. Poorly preserved, dehydrated fish are not an adequate water source.

Additional tests to monitor food quality during storage (and also at the time of purchase) may include analysis for trimethylamine, peroxide, histamine, volatile nitrogen, heavy metals and bacterial counts. The need for such tests could be in response to a visual inspection that questions the quality of the food fish.

Food supplies must be stored in facilities that ensure adequate protection against deterioration, spoilage (harmful microbial growth), and other contamination, as well as nuisance animals. Freezers must be available on-site to store food, and refrigerators must be available for thawing. Freezers and refrigerators (or chilled/iced coolers for storage of food to be used in under 12 hours) should be used for all perishable food to prevent bacterial contamination and loss of nutrients. The nutritional value and wholesome qualities of food must be retained until the time of feeding.

In general, fish should be stored at -18°C or lower. (CFIA, 2012). However, long-term storage should be at -25 to -30°C. Maximum storage times at -18°C for frozen fatty fish (e.g., salmon, mackerel and lake trout)

is two months, while leaner fish (e.g., cod, haddock, pike and smelt) may be stored for up to six months, and shellfish for two to four months (CFIA, 2012). A temperature alarm system for the freezer should be installed to warn of malfunction.

The freezer should be of a size to allow for proper stock rotation. Shipments of fish should be carefully rotated. Additionally, air circulation and ventilation of the freezers should not be compromised by inappropriate stacking of fish boxes or ice accumulation in air ducts. Food containers should not be stored directly on floors or touching walls.

Substances that are potentially toxic or harmful to marine mammals must not be stored or used in food storage or preparation areas, with the exception of cleaning agents which may be kept in secured, designated cabinets that are located to prevent food contamination.

Storage facilities must be appropriately cleaned and disinfected to prevent bacterial contamination of equipment and facilities.

7.6.4 Food handling, thawing, and preparation

Guideline 51:

Food must be handled, thawed, and prepared in a manner that ensures uniform thawing and preservation of nutritional value.

Considering the fragile and perishable nature of fish and invertebrates, it is crucial to handle and process the food in a manner that retains its nutritional value. Handling and freezing tends to break down the tissues, making the food more susceptible to bacterial invasion after thawing. Furthermore, incorrect thawing could increase the loss of nutritional value.

Thawed fish should have bright red gills, prominent clear eyes and firm elastic flesh. Old or refrozen fish appear dull, and have cloudy and red-bordered eyes and soft flesh; finger impressions are easily made and remain.

It is preferable to thaw fish in a space that does not exceed 4°C. However, individually bagged fish can be thawed under less stringent conditions, for example under cold running water. Thawing unbagged fish in cold running water is not desirable because it increases the loss of water-soluble nutrients. Thawing in standing water is not recommended because of the possible increase of contamination by micro-organisms. The use of fans to speed thawing is not recommended as it could dehydrate the fish.

Thawed fish should never be refrozen. All thawed food must be consumed or refrigerated and discarded within 24 hours.

Fresh or thawed fish should be rinsed or dipped in water, examined for spoilage or foreign bodies, and individually sorted into the buckets or containers before being stored in the refrigerator or fed to animals. This washes off any debris that may have been attached to the fish during the catching and handling operation.

Animal care staff and other personnel involved in the handling of food must adhere to an appropriate personal hygiene regimen.

7.6.5 Feeding

Fresh or thawed fish should be transported from the refrigerator to the animals in containers that maintain their nutritional value. Food should be kept out of direct sunlight and away from heat. Food should have an internal temperature no greater than 4°C at the time of feeding. All food containers and portable coolers should be easily cleaned and sanitized.

Marine mammals should be fed individually and by hand (unless contraindicated by the study objectives) from personnel with the necessary knowledge to ensure that each animal receives an adequate quantity. Food intake will usually be increased if the rations are spread over the course of a day. New animals may have to be coaxed to eat by placing fish in the water. Except under veterinary advice, food should not be left on the pool bottom or floating in dispensers for more than an hour. It is necessary for each animal to accept food from more than one person to ensure consistency in the event of a staff change, and all personnel involved must be able to recognize deviations from normal feeding in each marine mammal.

Guideline 52:

Any precipitous or unexpected change in appetite must be brought to the veterinarian's attention immediately.

Sick animals often become more selective and may need continuous coaxing to eat. When necessary, and under the instructions of a veterinarian or marine mammal expert, pinnipeds and cetaceans can be force fed, either by placing fish in their mouths or by a stomach tube using a slurry of fish. This can also be used to provide a source of fluids to dehydrated animals.

Species-specific changes in seasonal feeding patterns may influence food intake. Staff must be able to distinguish between normal fasting, reduced intake due to illness, and starvation, the latter being associated with inadequate food supply. Starvation is unacceptable for any species kept in captivity.

7.6.6 Food as reward

Guideline 53:

Food can be served as a reward, but not withheld as a punishment. Food deprivation must not be used as a method of training marine mammals.

Food deprivation is not appropriate, except in the case of short periods of fasting for the purposes of transport, preparation for medical procedures or where research studies dictate. In the case of food restriction experiments, stringent guidelines must be followed (CCAC, 1993).

7.7 Handling and Restraint

7.7.1 Handling

Handling of animals should be conducted with care to avoid trauma, overheating, excessive cooling, distress, physical harm and unnecessary discomfort. Those handling animals should have demonstrated expertise in currently accepted professional standards and techniques for the species involved. They should be able to recognize abnormal behaviour and signs of distress for the species.

Animal training can facilitate access to, and handling of, animals and allow routine collection of blood and other samples, while minimizing the use of restraint (see Section 7.8. Animal Training).

7.7.2 Restraint

The well-being of the animals during restraint is of paramount importance. Improper restraint may lead to major and potentially fatal physiologic disturbances, stress or injury.

Any decisions regarding the use of physical or chemical restraint should be undertaken through consultation with people having knowledge and experience with the species, and preferably the particular animal, and their response to restraint. The decision should be based upon the anticipated duration and invasiveness of the procedure to be undertaken, the need for analgesia, the degree of stress involved for the particular species or individual, and the safety of the personnel involved. Standardized procedures involving predictable chemical restraint with good analgesia and reversal agents exist for some species, but not for others.

Personnel should be familiar with the species to be restrained and competent in the techniques to be used. The current literature and experienced professionals should be consulted before handling an unfamiliar species.

7.7.2.1 Physical restraint

Guideline 54:

Effective methods of physical restraint, that minimize the possibility of physical injury and stress to the animal while maximizing human safety, should be chosen.

Physical restraint techniques should be tailored to the species and body size. All procedures requiring physical restraint should be well planned in advance. Facility managers should have appropriate and functional handling equipment on hand. The means for safely moving such equipment into and out of enclosures must also be available.

Before physical restraint is applied, the situation should be evaluated to determine whether the planned procedure can be safely and effectively accomplished under behavioural control. If physical restraint is required, the following should be assessed:

- the need for any chemical restraint or analgesia;
- the safety of the animal and the staff;
- the availability of appropriate facilities and equipment;
- the availability of skilled and appropriately trained people to perform the restraint procedure; and
- unexpected events that might occur, and contingency plans.

Handlers should endeavor to keep the duration of procedures to a minimum. Prolonged stressful restraint is not acceptable. Handlers should also minimize sensory stimuli by handling animals quietly and without sudden movement. Restraining devices or supplemental chemical restraint may be necessary to prevent injury to an animal or handler. During restraint, the animal's vital signs must be monitored.

When marine mammals are removed from the water, care should be taken to prevent skin abrasions and hyperthermia; a smooth work surface and frequent spraying with water help to prevent these problems.

When physical restraint of a cetacean is required, the animal can be held in a fabric stretcher, supported by steel poles, with holes for the pectoral fins (Reidarson, 2003). The amount of time that cetaceans are kept out of the water should be minimized, as the lack of support provided by the water can lead to congestion of tissues, overheating and heart failure.

Pinnipeds can be handled with manual restraint, squeeze cages, or an array of equipment such as nets, baffles, etc. Young pinnipeds are best restrained on land by holding their neck just behind the skull and covering their eyes with a towel; for larger or stronger pinnipeds, a second handler is needed to firmly hold the animal's front flippers against its sides (Gage, 2003). For untrained, very large or potentially aggressive species (Grey seals, Steller sea lions, etc.), a net, squeeze cage, wooden boards for herding, restraining beds, and pole nets are options.

Sea otters can be manually restrained with nets, or a combination of stuff sacks and/or squeeze cages.

7.7.2.2 Chemical restraint

Tranquillizers and anesthetics have an important role in the responsible handling and care of animals undergoing medical procedures likely to induce stress and/or pain. The principal goals of anesthesia are: 1) to render the animal unconscious or deeply sedated, with a minimum amount of stress and no injury to the animal; and 2) to ensure safe and rapid recovery. However, it is important to be aware of the non-typical response of many marine mammals to these drugs, due to their specific physiology and anatomy. Extreme caution should be used in the application of drugs, and they should only be used under direct supervision of an experienced veterinarian.

Use of anesthetics can be a dangerous undertaking, especially with whales, as they may cause asphyxiation; not all marine mammals will breathe once anesthesia has been introduced. Because marine mammals may develop apnea in response to some anesthetic drugs, local anesthesia in association with physical restraint is best for minor surgical procedures.

Published information on drugs and regimens commonly used in restraint of marine mammals must be considered as experimental, as they have not been registered or received regulatory approval for use with these animals.

7.8 Animal Training

Training can provide marine mammals with physical and mental stimulation, facilitate medical examinations and procedures, and provide researchers with access to scientific information on the animals in a manner that is not stressful for the animals (as noted in Section 7.7.1 Handling).

Animal training should take into account the natural behaviours of the animal and incorporate variations on these behaviours. SOPs for animal training should be developed that describe the objectives and goals, methodology and evaluation criteria for each animal. The SOP should detail responsibility for oversight of the training program and authority for making decisions regarding animal training. Appropriate record-keeping practices and contingency plans for emergencies should also be described.

Training of marine mammals should employ operant conditioning training techniques. Punishment must never be used in the training of marine mammals. Personnel conducting training must be competent, with demonstrated expertise.

Marine mammals may be temporarily housed in special enclosures for medical and non-medical training purposes. Staff should be consulted with respect to the separation of animals and the development of enrichment strategies for animals housed separately (as noted in Section 7.9 Quarantine and Isolation).

7.9 Quarantine and Isolation

Quarantine is required for newly acquired animals, while isolation is for any sick animal that should be separated from others. The concept of quarantine or isolation because of infectious disease concerns should not be confused with separation for behavioural or management purposes (described in Section 7.10 Behavioural or Management Separation).

Guideline 55:

Each institution should have the ability to quarantine any newly-acquired animals and isolate, for medical reasons, any marine mammal housed in the institution.

A quarantine program should be in place to minimize the risk of exposure of staff and animals housed in the facility to infectious agents that might be transferred by newly-acquired animals. Considerations should include proximity of respective pool systems, possibility of fomite or aerosol spread, and the manner in which water is filtered and sanitized between the pools.

There should be no circulation of water between quarantine enclosures and other enclosures. For facility requirements for quarantine, see Section 3.2.1 Spatial requirement of enclosures. As noted in Section 3.2.1.5 Space for medical needs and quarantine, quarantine facilities may differ in size from primary pools; however, efforts must be made to provide a reasonable quality of life for the animals.

A written plan is required for animals that are housed alone, including justification for the length of time the animal will be kept separated or isolated, the type and frequency of enrichment activities, and plans for interaction with animal care personnel and visual/auditory access to conspecifics. In all cases, these plans should be approved by the veterinarian, biologist or other expert, in consultation with institution staff experienced with marine mammals where appropriate. The separation period should be documented in the animal's records.

The veterinarian is responsible for all decisions regarding quarantine or isolation (CALAM/ACMAL, 2007); however, such decisions should be made in consultation with animal care personnel and facility managers.

Newly-acquired animals should be quarantined for at least 30 days, or a period of time determined by the veterinarian to be sufficient for minimizing the disease risk to the resident animals. Such decisions should be made in consultation with animal care personnel and facility managers. When the quarantine period occurs at another facility, the animals should be medically examined upon arrival, as transportation may induce stress (Small and DeMaster, 1995) and lead to expression of endogenous pathogens and increased susceptibility to novel pathogens.

Prior to acquisition of the animal(s), a plan should be in place to manage the introduction to the resident population following quarantine, as appropriate, and to manage any compatibility problems (Cox, 1992).

If an entire group of animals may have had exposure to a disease, it may be best to keep the group together but isolated from other animals in the facility (CALAM/ACMAL, 2007). However, individual separation should still be possible whenever necessary. This may be accomplished through the use of removable separation walls in the isolation area, together with temporary small holding facilities.

A sanitation program to minimize the chance for transmission of infectious diseases between animals should be implemented. Tools and equipment should be dedicated to isolation areas. Staff should use such precautions as disinfectant footbaths (following an SOP describing appropriate contact time between footwear and the solution, with the solution changed regularly) and protective clothing. Enclosures that are used to contain marine mammals with an infectious or contagious disease must be cleaned and sanitized according to the instructions of the veterinarian or marine mammal disease specialist. Animal care staff should not work in isolation areas and other holding areas on the same day. If, because of lack of personnel, it is impossible to provide this level of isolation, then an alternate procedure recommended by the veterinarian should be followed (e.g., shower and complete change of clothing between working with animals of different health status, and working with the healthiest animals first).

7.10 Behavioural or Management Separation

Guideline 56:

Each institution should have the ability to separate any marine mammal for behavioural or management purposes.

When separation of an animal is necessary, every effort should be made to minimize the length of time of the separation. The duration of separation should be determined in consultation with the veterinarian, based on the welfare of the animals. Separation for management purposes should permit continuation of visual and/or acoustic contact as much as possible, unless the reason for separation is based upon aggression or dominance.

Reasons supporting the separation of a marine mammal should be approved by the veterinarian and ACC and documented in the animal's record. The following are among the most common reasons for separation of an animal:

- to prevent breeding;
- to provide protection to a mother and offspring; and
- to protect an animal from aggressive behaviour of another animal (in such cases, relocation to another institution should be considered).

7.11 Breeding Management

7.11.1 Breeding and birthing

The special circumstances which may arise with pregnant females, or females with calves or pups, require facilities with adequate space and pool configurations to permit separation of animals. Arrangements during birthing and calf or pup rearing should ensure that appropriate social groups are maintained for both males and females.

The reproductive status of males and females used in breeding programs should be ascertained by thorough physical examinations, hormonal assays, ultrasonography or other best practices.

Veterinary and animal care staff with experience in pregnancy care, parturition, and post-natal care must be available during birthing. There must be a plan in place for experienced staff to provide the support needed during delivery, if necessary. This plan must be species specific for the care of the pregnant female,

the young and other conspecifics in the event of an emergency. The plan must be developed with veterinary input and approved by a veterinarian.

Contingency plans must be developed in advance for emergency intervention before, during, or after delivery; unexpected pregnancies; weaning; illness; or abnormal behaviour. Necessary supplies must also be acquired prior to birth.

Each birth should be monitored to ensure that there are no parturition difficulties. Physiological measures on the parturient female should be made as necessary. Careful monitoring of young is required initially to ensure that suckling is established, and then complete monitoring is required throughout the post-natal period. Records should include data on respiratory rate, time to first nursing, nursing rate, etc. Deaths must be fully documented.

7.11.2 Contraception

Segregation of groups according to sex or the use of contraception should be considered if breeding is not part of an ACC-approved protocol. For information on contraceptive methods, see the AZA Wildlife Contraception Center (<http://stlzoo.org/animals/scienceresearch/contraceptioncenter>).

7.11.3 Care of young

Guideline 57:

An institution that houses breeding marine mammals or that may obtain young animals should develop species-specific hand-rearing protocols.

Staff involved in the care of young animals should consult and maintain communications with staff and veterinarians at other facilities who have experience in breeding and rearing the species of interest. Advice should be sought in determining critical milestones, such as time to first nursing.

Mother-rearing of young animals is preferred, and every effort should be made to encourage and maintain a strong bond between the mother and young. This may include conditioning the pregnant female to accept separation from the group to reduce stress if separation becomes necessary.

Information is available in the literature regarding suggested milk formulas and frequency of feeding for some marine mammal species, as well as stomach-tubing and bottle-feeding techniques, determination of caloric value, behavioural considerations, approaches to weaning, and descriptions of appropriate housing for hand-reared young (e.g., cetaceans (Townsend, 1999); phocids (Duer, 2002); otariids (Gage, 2002); walrus (Gage and Samansky, 2002); and sea otter (Townsend and Gage, 2001)). Because some supplies and formula ingredients for supplemental feeding are not readily available, they should be acquired prior to possible need. Current information on techniques and milk formulas for hand-rearing should be sought as it is frequently being revised.

ANIMAL HEALTH CARE

Institutions housing marine mammals are responsible for ensuring that the health of each animal is promoted through ongoing health care programs and the provision of veterinary health care services. Marine mammal health care should be:

- safe – avoiding injuries and illness to both animals and care givers;
- effective – providing care based on the best scientific knowledge; and
- timely – reducing waits and sometimes harmful delays for both animals and care givers.

Adequate veterinary care for marine mammals includes the establishment of SOPs for health monitoring and disease control, the prevention of zoonotic diseases, and delineation of responsibility for ensuring that proper precautions are followed for containment and disease control.

8.1 Veterinary Program

Guideline 58:

Institutions housing marine mammals must have a written veterinary care program. This should be developed by a veterinarian in collaboration with other experts (e.g., marine mammal biologists).

Disease surveillance is a major responsibility of the veterinarian and facility manager. A rigorous veterinary program should be implemented which includes visual and physical examinations of the marine mammals, as well as establishing water quality standards, review of water quality monitoring records, review of husbandry records, and visual inspections of facilities. Records detailing the medical history of each animal should be maintained on site, as indicated in Section 7.3.2 Records of animal health.

Guideline 59:

Where appropriate, animal training should be used to facilitate care and control of the animals for medical purposes.

Marine mammals should be trained to facilitate their handling, unless they are used in an approved research study where such training would be inappropriate. The training of behaviours that facilitate potentially stressful examination procedures, both external and internal, or the collection of diagnostic samples such as blood on a routine basis, can benefit the animals and personnel. Unless well trained, most animals will not remain immobile for close examination without restraint. See Section 7.8 Animal Training.

Well-trained animals can be adequately controlled to permit minor medical exams and procedures to be performed without restraint. However, either physical or chemical restraint should be used when a more invasive procedure is necessary or when handling an untrained animal. Painful or invasive procedures

should be performed using appropriate analgesia or anesthesia, unless this would be more harmful or distressing to the animal than the procedure itself. See Section 7.7.2 Restraint.

8.2 Preventative Health Care

Guideline 60:

A program of preventative health care must include a complete annual physical examination for each marine mammal, establishment of diets specific to each animal, and regular oral examinations and treatment of dental problems.

As noted in Section 7. Husbandry, daily monitoring by animal care staff should note each animal's physical appearance, activity, temperament, food intake (food type and quantity) and any behavioural changes, as well as breath rate in the case of cetaceans. Visual examinations should be conducted by the veterinarian at least once per month, and physical examinations must be conducted on each marine mammal annually, except when otherwise prescribed by the veterinarian. Physical examinations should include laboratory analysis of blood constituents or other typical measures of physiologic function, such as serum chemistry and urinalysis.

Behavioural indices of disease are often not recognized until late in the disease process and subcutaneous layers of blubber often preclude palpation of internal organs and auscultation of the heart and lungs. For these reasons, blood values and microbial cultures are important diagnostic tools when hints of an illness arise.

A database of normal values, both for species and individuals, should be established as part of a preventative health care program, through the regular collection and analysis of blood and serum and freezing of serum for future analysis. Other potential sources of data include urine and other body fluids. The collection of microbial swabs for the purpose of microbial isolation helps to identify the normal microflora of an animal in good health and facilitates recognition of potentially problematic pathogens at a later time. Parasite screening and treatment should be conducted where indicated.

Older pinnipeds and sea otters are prone to accumulation of plaque, gingivitis and periodontal disease. Regular assessment of the oral health of these animals, which can be conducted through husbandry routines, is important for early detection of problems and for determining when dental procedures are warranted.

Historically, tusk health and integrity has been a problem with walrus held in captivity. Regular health assessment of tusks and appropriate husbandry practices should be part of a health program for walrus.

8.2.1 Diagnostic tools

Consistency must be established in the collection, handling and processing of biological samples to maximize the value of analytical results. Routine diagnostic services, as well as services for post mortem examination, histopathology, microbiology, clinical pathology and parasitology, should be available either within the institution or through established outside services whenever determined necessary by the veterinarian (CALAM/ACMAL, 2007).

It is preferable to establish a relationship with a particular laboratory and have all samples processed at that laboratory so that trends can be detected and any differences between laboratories can be avoided.

8.3 Treatment

A veterinarian should be consulted to determine the appropriate treatment for any suspected health problem (CALAM/ACMAL, 2007).

A significant challenge to the administration of therapeutic agents in marine mammals is access to, and handling of, the individual animals under treatment. Ready access, separation of animals under treatment, and administering medication should be accomplished in a manner that minimizes stress and risk of injury for the animal and for personnel involved in the procedures (see Section 7.7 Handling and Restraint and Section 7.9 Quarantine and Isolation).

Considerable information now exists to specify effective doses and administration schedules for a variety of marine mammal therapeutics; however, the doses are experimental only. This information should be used in accordance with the CVMA's *Extra-Label Drug Use (ELDU) – Position Statement* (CVMA, 2010). The indiscriminate use of antimicrobials is not recommended because of the possibility of encouraging resistant strains of bacteria (CVMA, 2009a; Measures, 2004).

When medication has been administered to a marine mammal, the animal should not be released back into the wild until an appropriate withdrawal time has passed (see *CCAC guidelines on: the care and use of wildlife*, Section E.2.7 Drug residue (CCAC, 2003a); and *Extra-Label Drug Use (ELDU) – Position Statement* (CVMA, 2010)).

8.3.1 Pharmacy

Agents such as oral and injectable antibiotics for common systemic infections, and oral and injectable medications to combat inflammation, as well as appropriate chemical restraint agents, should be readily available for prompt treatment, but should only be administered under the direction of a veterinarian.

Drug storage and inventory must be in compliance with the Controlled Drugs and Substances Act, 1996. All drugs must be properly managed, dispensed and disposed of according to professional practice. Outdated drugs must not be used. (For more information, see the Veterinary Drugs Directorate (VDD), Health Canada, at <http://www.hc-sc.gc.ca/dhp-mps/vet/index-eng.php>).

8.3.2 Animal surgery procedures

Guideline 61:

The veterinarian is responsible for all surgical procedures and must approve all pre-operative and post-operative procedures.

The veterinarian must perform all surgical procedures, or in the case of minor surgeries, closely supervise the procedures (see CALAM/ACMAL (2007) and the CVMA's *Veterinary Surgical Procedures – Position Statement* (CVMA, 2009b)). The ACC must approve any surgeries to be performed for scientific purposes.

The veterinarian is also responsible for monitoring, reviewing and providing recommendations for pre-operative procedures, anesthetic selection and administration, and surveillance during anesthesia. Qualified personnel must be available to provide surgical assistance and post-operative care, and to maintain appropriate records. Analgesics should be used to provide adequate intra-operative and post-operative pain control when painful procedures are performed.

Surgical procedures on cetaceans will likely be rare, and those for very large pinnipeds might require customized protocols.

8.4 Pathogens

Guideline 62:

Animal care staff should be familiar with signs of common diseases of marine mammal species under their care, as well as the significance and procedures to ensure proper treatment of those diseases under the veterinarian's guidance and responsibility.

Access to reliable laboratory services for culture and accurate identification of microorganisms should be available.

The list of pathogens known to cause serious disease in marine mammals is lengthy, for examples, see Daley (2001), Dunn et al. (2001), Higgins (2000), Kennedy (2001), Kennedy-Stoskopf (2001), Measures (2001), Miller et al. (2001), and Reidarson et al. (2001).

Marine mammals may harbour numerous pathogenic organisms known to be potentially zoonotic (Cowan et al., 2001), and they may occasionally acquire infection from humans (anthroponoses) (Measures, 2004). Strict adherence to sound principles of hygiene, including limited direct contact between marine mammals and humans, and strict hand-washing policies (before and after contact) should be followed. Contact of marine mammals with domestic or wild terrestrial mammals, including pets, must be avoided.

For veterinary installations and general laboratory guidelines to avoid disease transmission between humans and animals, see the *Canadian Biosafety Standards and Guidelines* (PHAC and CFIA, 2013).

8.5 Mortality and Euthanasia

Guideline 63:

A complete veterinary post mortem examination should be performed on any marine mammal that dies in captivity.

The post mortem examination should be conducted by a knowledgeable veterinarian, preferably a trained pathologist or other professional competent to describe and interpret gross findings and to collect and preserve diagnostic samples in an appropriate manner for further analysis.

A preliminary post mortem examination report, listing all gross lesions observed, should be prepared by the examining veterinarian. The final post mortem examination report should include all gross and histopathologic findings, the results of all laboratory tests performed, a pathological diagnosis, and relevant comments that integrate the laboratory results. Post mortem examination records should be maintained at the marine mammal's home facility and at the facility at which the animal died, if different.

Carcasses must be disposed in compliance with provincial/territorial and local regulations.

A file of requests for post mortem tissues for research purposes should be maintained by the institution, so that appropriate tissues and samples can be supplied to research institutions as they become available. Additionally, carcass skeletons or parts may be useful for education purposes.

Guideline 64:

Each institution must have a policy on euthanasia, approved by the ACC.

All personnel responsible for carrying out euthanasia must be knowledgeable and competent to perform the procedure in a compassionate, professional and species-appropriate manner that avoids distress to the animals. Euthanasia may be necessary for injured or diseased animals that are in pain and unlikely to improve in health status to a satisfactory level with time and treatment, or where the welfare status of the animal cannot be maintained to a satisfactory level. See the *CCAC guidelines on: euthanasia of animals used in science* (2010) for guiding principles and recommendations on euthanasia.

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APPENDIX 1

REGULATIONS AND JURISDICTION

Prior to engaging in any activity concerning a marine mammal, institutions should make themselves aware of any relevant regulations. The following sections are intended to provide a starting point for consideration of existing regulations. The list is not exhaustive and the regulations may change over time. Where conflicts arise between this list and regulations, regulations take precedence.

1. International

1.1 International transport regulations

The International Air Transport Association (IATA) *Live Animal Regulations (LAR)* provide worldwide standards for the packaging, care and handling of live animals for international transport. The IATA *Live Animal Regulations* have been adopted as official guidelines for animal transportation by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Office International des Epizooties (OIE), and are being enforced in many countries. Copies of the *Live Animal Regulations* can be obtained through the IATA website (www.iata.org). For cases where the IATA *Live Animal Regulations* are not applicable, Chapter 7.2 Transport of animals by sea and Chapter 7.3 Transport of animals by land, of the World Organisation for Animal Health (OIE) *Terrestrial Animal Health Code* should be used (<http://www.oie.int/en/international-standard-setting/terrestrial-code/access-online/>).

1.2 Regulations of other countries

Importation, exportation, or other transactions with institutions in other countries must adhere to applicable regulations set by the individual countries.

2. Federal

2.1 The Marine Mammal Regulations (MMR) under the Fisheries Act

Section 52 of the *Fishery (General) Regulations* grants Fisheries and Oceans Canada (DFO) the authority to issue live-capture permits for the purposes of rehabilitation, research or education. Consideration is given to the conditions of the captive facilities in issuing a capture permit. The MMR, under Section 56 *Fishery (General) Regulations*, also grants DFO the authority to issue permits for the transport or transfer of captured marine mammals and for the release of marine mammals back to the wild. Section 22 (1)(u) authorizes DFO to set conditions regulating the method of capture and transport, as well as the conditions of captivity for marine mammals that are captured in Canadian waters for research or educational purposes.

The *Fisheries Act*, *Marine Mammal Regulations* and *Fisheries (General) Regulations* can be viewed at <http://laws.justice.gc.ca/en/F-14/>

2.2 The Species At Risk Act (SARA)

The *Species At Risk Act* (SARA) (http://www.sararegistry.gc.ca/default_e.cfm) prohibits the harassing or capturing of any listed species or designatable units of a species (e.g., resident and transient killer whales).

Species protection status under SARA is considered by DFO when issuing permits for capture, research or rehabilitation under the MMR. More information on SARA can be found at www.dfo-mpo.gc.ca/species-especes/home_e.asp. DFO should be consulted for further information in relation to marine mammals.

2.3 Wild Animal and Plant Protection and Regulation of International and Inter-provincial Trade Act (WAPPRIITA)

The Canadian Wildlife Service (CWS) enforces CITES through the *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act – WAPPRIITA*, S.C. 1992, c. 52., which aims to protect species from overexploitation due to trade, and to safeguard ecosystems from the introduction of potentially harmful species. The Act applies to designated plants and animals (according to the *Wild Animal and Plant Trade Regulations*), alive or dead, their parts or derived products.

WAPPRIITA regulations must be met and CITES permits issued, when applicable, for import or export of CITES-listed marine mammals (or their parts) into and out of Canada. CITES Export Permits for marine mammals are issued by DFO, while CITES Import Permits are the responsibility of CWS. Application forms can be found at www.cites.ec.gc.ca for imports and exports. Note that only marine mammals listed by CITES require CITES permits.

The Act and a full and current list of protected species can be found at <http://laws-lois.justice.gc.ca/eng/acts/W-8.5/index.html>

2.4 The Health of Animals Act

The *Health of Animals Act*, S.C. 1990, c. 21. (<http://laws-lois.justice.gc.ca/eng/acts/H-3.3/FullText.html>) is intended to protect human and animal health.

2.5 National Code on Introduction and Transfers of Aquatic Organisms

Prior to the introduction of a marine mammal from another region or country to a facility with direct or indirect contact with the local marine environment, and before releasing a marine mammal into the wild, authorisation must be obtained from DFO under the *National Code on Introduction and Transfers of Aquatic Organisms* (art. 55 and 56 of the *Fisheries Act*).

2.6 Criminal Code of Canada (Sections 445-446)

Under Sections 445-446 of the *Criminal Code of Canada* (<http://laws-lois.justice.gc.ca/eng/acts/C-46/>), it is an offence to willfully cause unnecessary pain, suffering or injury to an animal, or for a person to willfully neglect an animal that is in his or her care. Animal welfare regulations, as applied to marine mammals in captivity, are enforced by federal and municipal peace officers, as well as officers of Humane Societies and Societies for the Prevention of Cruelty to Animals (SPCAs).

2.7 The Oceans Act

The *Oceans Act* (<http://laws-lois.justice.gc.ca/eng/acts/O-2.4/index.html>), administered by DFO, defines Marine Protected Areas (MPA). The Minister may impose prohibitions within designated or interim MPAs and recommend actions to protect ‘at risk’ marine resources and habitats. Such prohibitions may influence the issuance of capture permits for designated areas.

2.8 Canada Wildlife Act (CWA)

Administered by Environment Canada, prohibitions and species protection measures imposed under the CWA (<http://laws-lois.justice.gc.ca/eng/acts/W-9/index.html>) may influence the issuance of capture and release permits within wildlife refuges.

2.9 Canada National Parks Act

Prohibitions and species protection measures imposed under the *Canada National Parks Act* (<http://laws.justice.gc.ca/en/N-14.01>) influence the issuance of capture and release permits within National Parks.

2.10 Canada National Marine Conservation Areas Act

Canada National Marine Conservation Areas Act (<http://laws.justice.gc.ca/en/C-7.3>) sets aside representative areas of ocean in each of Canada's marine ecoregions for protection and zoned use. This may influence capture and release permits.

3 Provincial/Territorial

3.1 Provincial/territorial legislation regarding capture

Aboriginal and treaty rights in Canada provide for priority access to wildlife for subsistence and other needs by Aboriginals. For marine mammal stocks supporting Aboriginal harvest, access to the resource by others will require consultation with DFO and Aboriginal groups. Nunavut authorities can set harvest limits on marine mammals in conjunction with the appropriate government agency responsible for the conservation of the species (<http://laws-lois.justice.gc.ca/eng/acts/N-28.7/>).

Most Canadian provincial and territorial jurisdictions have wildlife Acts that require a licence to capture animals from the wild and a permit to hold native wildlife in captivity (see appendix E of the *CCAC guidelines on: the care and use of wildlife* (2003) for a list of provincial and territorial wildlife departments and Acts). While wild marine mammals are not typically within the jurisdiction of provincial governments, holding of marine mammals in captivity is the responsibility of the provinces, and their care while in captivity falls under provincial animal protection legislation.

3.2 Provincial animal protection Acts

Most provinces maintain permitting standards and requirements for captive wildlife facilities, although these differ among provinces. The care of marine mammals within captive facilities is the responsibility of the provincial governments. Most provinces also ensure the fair and humane treatment of animals in captivity by way of a prevention of cruelty to animals Act, giving enforcement authority to the SPCA and national, provincial and local police forces. Animal Protection Officers have full authority over provincial animal welfare legislation and assist in potential Criminal Code of Canada prosecutions.

3.3 Provincial/territorial park and protected area legislation

All provinces and territories maintain some form of protected area legislation. Such legislation may influence the ability to issue capture and release permits in designated areas.

3.4 Additional legislation

Some provinces and territories have additional legislation that could be relevant to marine mammals in captivity that are used for research and/or educational purposes. For example, in Ontario, the *Animals for Research Act* (www.e-laws.gov.on.ca) controls the source of research animals and specifies humane treatment for animals used in research and education. It provides regulations for minimum care and housing standards, and provides for the inspection of research facilities.

4. Municipal

Municipal bylaws may be in effect to restrict the importation of certain species. These regulations may influence the ability to transport and hold marine mammals in specific Canadian institutions.

APPENDIX 2 USEFUL RESOURCES

Organizations

Alliance of Marine Mammal Parks and Aquariums (AMMPA) (www.ammpa.org).

Association for Zoos and Aquariums (AZA) (www.aza.org)

Canadian Association of Laboratory Animal Medicine (CALAM/ACMAL) (<http://calam-acmal.org/>)

Canada's Accredited Zoos and Aquariums [formerly Canadian Association of Zoos and Aquariums] (CAZA) (www.caza.ca)

Canadian Veterinary Medical Association (CVMA) (<http://www.canadianveterinarians.net/>)

International Association for Aquatic Animal Medicine (IAAAM) (www.iaaam.org).

International Marine Animal Trainers Association (IMATA) (www.imata.org)

International Zoo Educators Association (IZE) (<http://www.izea.net/>)

National Marine Educators Association (NMEA) (<http://www.marine-ed.org/>)

World Association of Zoos and Aquariums (WAZA) (<http://www.waza.org>)