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REPORT ON THE OPEN-ENDED INTERSESSIONAL CONTACT GROUP ON DISEASES OF ANTARCTIC WILDLIFE

REPORT 2 – PRACTICAL MEASURES TO DIMINISH RISK (DRAFT)

Report on the open-ended intersessional contact group on diseases of Antarctic wildlife
Report 2 – Practical measures to diminish risk (draft)

Background

CEP III agreed to the following terms of reference for the open-ended intersessional contact group (ICG) on diseases of Antarctic wildlife:

> *"That the contact group prepare an initial report for CEP IV which:*
> - *provides a review of the introduction and spread by human activity of infectious disease causing agents in Antarctica and provides a risk assessment of those activities which may introduce or spread disease causing agents in Antarctica*
> - ***presents practical measures that might be implemented by Parties to diminish the risk to Antarctic wildlife of the introduction and spread by human activity of infectious disease causing agents****; and*
> - *presents practical measures that may be implemented to determine the cause of unusual wildlife mortality and morbidity events in Antarctica and to reduce the likelihood that human activity may exacerbate these events."*
>
> (CEP III Report Paragraph 52)

This paper reports on the work of the ICG in response to the second of the terms of reference. The ICG's draft report is at Annex 1. Australia coordinated the process, with participation from AEON, Australia, IAATO, Italy and Sweden.

A report in response to the first of the terms of reference (Review and Risk Assessment) has been submitted to CEP IV as an annex to a separate working paper. The ICG does not yet have a draft report in response to the third of the terms of reference.

The report on practical measures to diminish risk is presented to CEP IV as a draft to encourage further participation in the work of the ICG. The implementation of practical measures is likely to have implications for the way that Antarctic activities are undertaken and the establishment of practical measures within the Antarctic Treaty System may involve Parties in formal *decisions, resolutions or measures* that could have implications for the domestic legislation of Parties. It is therefore important to the success of the practical measures that they are carefully considered.

The practical measures address human activities identified by the ICG as risks through the process of review and risk assessment. Before the report on practical measures is finalised it is important that the CEP indicates whether or not it endorses the list of human activities identified as a priority by the ICG.

The purposes of submitting the work of the ICG on practical measures to CEP IV as a draft are:
- to ensure they are discussed widely and to encourage the widest possible participation in their further development, and
- to ensure that the ICG has the opportunity to modify the practical measures to address priorities determined by CEP in its consideration of the review and risk assessment

Recommendations

It is recommended that:
- the CEP notes the draft report from the ICG on practical measures to diminish risk

- the CEP encourages Parties to continue participation in the work of the ICG to further develop the draft practical measures to diminish the risk to Antarctic wildlife of the introduction and spread by human activity of infectious disease causing agents in Antarctica
- the CEP asks the ICG to prepare a report for CEP V which:
  a) presents practical measures that might be implemented by Parties to diminish the risk to Antarctic wildlife of the introduction and spread by human activity of infectious disease causing agents; and
  b) presents practical measures that may be implemented to determine the cause of unusual wildlife mortality and morbidity events in Antarctica and to reduce the likelihood that human activity may exacerbate these events.

ANNEX 1

DRAFT REPORT - PRACTICAL MEASURES TO DIMINISH THE RISK TO ANTARCTIC WILDLIFE OF THE INTRODUCTION AND SPREAD BY HUMAN ACTIVITY OF INFECTIOUS DISEASE CAUSING AGENTS

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1 INTRODUCTION

The open-ended intersessional contact group on diseases of Antarctic wildlife has undertaken a review of the introduction and spread by human activity of infectious disease causing agents, and risk assessment of those activities which may introduce or spread disease causing agents in Antarctica. This process identified the following human activities as priorities for practical measures that might be implemented by Parties to diminish risk,

- Feeding of wildlife
- Actions following discovery of unusual mortality events
- Research that involves handling of Antarctic animals, particularly research on disease
- Import of food, particularly poultry products
- Waste disposal and sewage treatment
- Use of equipment and clothing before departure to Antarctica
- Serial visits to wildlife aggregations

A workshop on disease of Antarctic wildlife held in 1998 identified the following as general approaches that could contribute to reducing the risk of disease introduction and spread by human activity,

- Education and awareness
- Initial response to unusual mortality events
- Information exchange
- Cleaning or sanitising of equipment
- Source of food supplies
- Waste management, sewage treatment and effluent disposal
- Fundamental research on disease in Antarctic wildlife

These approaches have been widely disseminated and discussed, and were in general endorsed in a joint SCAR and COMNAP working paper to CEP III (XII SATCM/WP20) (SCAR and COMNAP 2000). The approaches are used as the framework for developing practical measures to diminish the risk to Antarctic wildlife of disease introduction and spread from those human activities identified as priority risks.

2 EDUCATION AND AWARENESS

2.1 Background

The success of all the other measures depends on their acceptance and adoption by people visiting Antarctica. Measures will not be effective unless the requirement for them is disseminated and they will be most effective if people understand the reasons for precautions. In addition, people that understand the reasons behind the concern about disease introduction will be better prepared to make appropriate decisions if presented with an unpredicted situation which has implications for disease introduction or spread.

2.2 Action required

Encourage operators to include an explanation of the potential for disease introduction and translocation, and simple procedures that should be adopted to reduce the possibility in pre-departure or in-transit briefings.

Collate a list of educational material on the topic of wildlife disease currently available from national Antarctic programs and tourist operators to determine what is available and where the gaps are.

Prepare and make available to all national operators and Antarctic tourism operators standard educational material such as posters and video/CD-ROMS to convey the following information,

1. Antarctic wildlife could be susceptible to wildlife diseases that occur in other regions,
2. People could accidentally introduce infectious disease causing agents from other regions of the world to the Antarctic or could accidentally spread disease causing agents that occur naturally in the Antarctic between locations,
3. Activities judged to bring some risk of disease introduction or spread include,
    a. Those that involve close contact with wildlife, such as disease research,
    b. The discovery or investigation of unusual mortality events,
    c. Importation of meat, especially poultry products, to the Antarctic,
    d. Feeding Antarctic wildlife,
    e. Disposal of kitchen waste,
    f. Moving between aggregations of wildlife with footwear or other clothing, equipment and vehicles that are contaminated with animal faeces.

3 INITIAL RESPONSE TO UNUSUAL MORTALITY EVENTS

3.1 Background

Unusual mortality events among Antarctic wildlife have occurred in the past and are by their nature unpredictable. It is unlikely that a wildlife mortality event will be discovered by someone with previous experience of such occurrences and it would be unwise to leave decisions on how to react to those discovering a mortality event. Most people do not know normal mortality rates among Antarctic species and may not recognise unusual mortality, as a consequence, information to help recognise unusual mortality is required.

A likely first reaction to discovery of an unusual mortality event would be to quickly check other localities to determine the spatial extent of the event. Under these circumstances, moving from location to location without some precautions could cause translocation of infection agents.

Development of a complete response plan for unusual wildlife mortality events in Antarctica is the 3rd of the three terms of reference for this Intersessional Contact Group and is not considered further here. However, ensuring the correct initial response to the discovery of a mortality event that may be caused by disease is an

important practical measure to diminish the risk to Antarctic wildlife of spread by human activity of disease causing agents.

3.2 Action required

If disease is suspected the first response should be to stand back, view widely, photograph (preferably digitally), count dead and dying, and note any obvious abnormal characteristics that can be seen from a distance, such as inability to stand, swellings or skin lesions. As soon as possible this information should be sent to Antarctic wildlife experts with expertise sufficient to determine whether the number of dead and dying and the characteristics of affected animals are within normal limits. Access to the site should be restricted to reduce the risk of transfer to uninfected populations until advice is received on whether the mortality event is unusual or likely to be caused by disease.

People discovering a suspected disease event should not visit other locations to determine the spatial extent of the disease without taking very careful precautions to ensure they do not transfer disease causing agents on footwear, clothing and equipment. Cleaning methods are discussed in Section 4.

If it is determined that an unusual mortality event has been discovered the response plan (to be developed) for unusual wildlife mortality events in Antarctica should be implemented.

4 INFORMATION EXCHANGE

4.1 Background

Exchange of information is an important aspect of most response plans for unusual wildlife mortality events developed for other regions and is a key component of the response plan developed in response to the 3rd of the terms of reference for this Intersessional Contact Group. The Antarctic Treaty System and associated organisations (such as SCAR and COMNAP) has established structures for information exchange and the use of these structures is preferred. To be effective in reducing the likelihood of human exacerbation of unusual mortality events reporting to alert others must occur quickly. It is therefore not appropriate to use established annual information exchange mechanisms for this purpose. Rather, reporting should use proven information networks such as the Antarctic Environmental Officers Network and IAATO to disseminate information.

4.2 Action required

A standard procedure for information exchange after the discovery of an unusual mortality among Antarctic wildlife is to be included in the response plan (to be developed) for unusual wildlife mortality events.

5 CLEANING/SANITISING OF EQUIPMENT

5.1 Background

Cleansing of clothing, equipment and vehicles is commonly used as a precaution against the transfer of disease causing agents in other parts of the world, particularly

when moving from a location in which a disease is known to be present. Priorities for cleansing should be,

1. clothing, equipment and vehicles that are to be brought into the Antarctic from a location that is experiencing an animal disease outbreak caused by an infectious disease causing agent,
2. clothing, equipment and vehicles that are to be moved from locations within the Antarctic region in which unusual wildlife mortality events have occurred or are suspected,
3. clothing, equipment and vehicles that have been in contact with Antarctic wildlife, particularly those used for activities such as disease research that involve close contact, and
4. clothing (particularly footwear), equipment and vehicles, that are likely to carry animal faeces, before moving from one distinct location to another (the term *distinct location* to be defined).

Simple cleaning of surfaces by steam cleaning or brushing with detergent solution is effective in removing viruses and is necessary for removing grease and organic dirt prior to any subsequent chemical decontamination, if this is required. Micro-organisms vary in their susceptibility to disinfectants. The best disinfectant will depend on characteristics of the disease causing agent (Table 1). Lipid containing viruses and vegetative forms of most bacteria are relatively susceptible. Fungi, acid-fast bacteria (*Mycobacterium* spp.) and non-lipid containing viruses are less susceptible, and bacterial spores are resistant to many disinfectants. Viruses cause most diseases of concern. The lipid content and size of viruses will determine whether they are susceptible to decontamination with detergents. Both Newcastle disease (paramyxoviridae) and avian influenza (orthomyxoviridae) can be inactivated effectively with detergents.

Table 1. The best disinfectants for use against different virus families

Category of virus	Virus families	Best disinfectants
Category A - Lipid containing viruses; intermediate to large size	Bunyaviridae, coronaviridae, flaviridae, herpesviridae, iridoviridae, orthomyxoviridae, paramyxoviridae, poxviridae, retroviridae, rhabdoviridae, togaviridae,	Detergents, hypochlorites, alkalis, Virkon®, glutaraldehyde
Category B - No lipid in virus; small size	Caliciridae, picornaviridae,	Hypochlorites, alkalis, Virkon®, glutaraldehyde
Category C - No lipid in virus; intermediate size	Birnaviridae, reoviridae,	Hypochlorites, alkalis, Virkon®, glutaraldehyde

Common bactericides like quaternary ammonium and phenolics are not effective against category B and C viruses.

5.2 Action required

The requirement to avoid, to the maximum extent possible, the importation of non-sterile soil to Antarctica should be re-enforced (Protocol on Environmental Protection to the Antarctic Treaty, Annex II, Appendix C).

Shortly before departure to Antarctica, equipment and vehicles should be cleaned using steam or hot water if possible together with brushing to dislodge encrusted soil

and organic matter. If only cold water is available then using cold water and brushing is better than not cleaning at all. Clothing supplied for use in Antarctica should be cleaned using normal laundry procedures prior to sending to Antarctica. Footwear should be cleaned with detergent and brushing on the ship during transit to Antarctica or just prior to boarding the aeroplane if flying. Stronger disinfectants should be used (Table 2) if there is reason to think that people, clothing, equipment or vehicles have been in contact with diseased animals, disease causing agents or have been in an area of known disease risk.

Table 2. Recommended disinfectants and concentrations for inactivation of viruses and bacteria

Disinfectant group	Dilution/final strength/contact time	Method of application and virus category
Soaps and detergents	As normal / as normal /10 minutes	Thorough cleaning is essential before other decontamination methods can be used effectively; effective for Category A viruses
Oxidising agents		
Sodium hypochlorite	1:5 / 2-3% available chlorine / 10-30 min	Categories A, B and C; not effective in presence of organic material; less stable in warm, sunny conditions (above 15^{o}C)
Calcium hypochlorite	30g/litre / 2-3% available chlorine / 10-30 min	
Virkon®	20g/litre / 2% w/v / 10 min	Active against all virus families
Alkalis		
Sodium hydroxide	20g/litre / 2% w/v / 10 min	Categories A, B and C; do not use in presence of aluminium and derived alloys (i.e. aircraft)
Sodium carbonate - anhydrous - washing soda	40g/litre / 4% / 10 min 100g/litre / 10% / 30 min	Effective in presence of high concentrations of organic matter
Acids		
Hydrochloric acid (10 molar)	1:50 / 2% v/v / 10 min	Use only when better disinfectants are not available; corrosive
Citric Acid	2g/litre / 02% v/v / 30 min	Safe for clothes and body; especially useful for foot and mouth disease virus
Aldehydes		
Glutaraldehyde	As appropriate / 2% w/v / 10-30 min	Categories A, B and C
Formalin (40%)	1:12 / 8% w/v / 10-30 min	Releases irritating, toxic gas
Phenols		All are effective anti-bacterials; not efficient against Category B viruses
Polyphenolic complex	1:25 / 4% / ??	
Chlorinated phenols	1:20 / 5% / ??	
Quaternary ammonium compounds		All are effective anti-bacterials; not efficient against Category B and C viruses
Benzalkonium chloride	1:10 / 10% / ??	
Chlorohexidine	1:1,000 / 0.1% / ??	
Dioctyl dimethylammonium	1:1,000 / 0.1% / ??	

chloride		
Iodines	?? / 0.4% / ??	Organic matter reduces the activity; useful in areas used for food preparation

In the Antarctic appropriate cleansing procedures will depend on circumstances. Under normal circumstances (when disease is not suspected) when moving from the vicinity of one 'discrete population' to another, footwear should be rinsed with water, using several changes of water to achieve the effect of serial dilution (sea-water or fresh-water may be used), and should be brushed.

The definition of a discrete population will depend on the species and on the terrain. Cleansing with water and brushing should normally occur before moving between discrete ice-free areas or before moving between islands. Whether cleansing should be performed when moving within ice-free areas and islands will depend on their size and on the characteristics of wildlife populations supported. If the wildlife populations form discrete aggregations with limited opportunity for natural mixing then cleansing before moving between aggregations is recommended. If personnel are visiting Antarctica from a ship, boot washing, as described above, should be repeated after each landing.

Cleansing procedures following activities that involve close contact with wildlife, such as research, should be more stringent and may require the use of stronger disinfectants. Environmental impact assessment of such activities should include assessment of the possibility of disease transfer and if a risk is identified appropriate procedures for cleansing equipment and clothing should be specified as a precautionary condition for approval.

Disinfectants are by their nature biocides and their use can cause health or environmental problems (Table 3). Strong disinfectants should not be used in a manner or situation in which they could cause problems. Hydrochloric acid and the aldehydes should only be used when no alternatives exist and then only by experienced personnel with appropriate safety equipment. The environmental risks associated with the use of disinfectants in Antarctica should be considered as part of the environmental impact assessment for any activity for which strong disinfectants are deemed necessary.

Table 3. Health and environment aspects of disinfectant use

Disinfectant	Health aspects	Environmental problems
Hypochlorites	Toxic for eyes and skin	Strong bleach; inhibited by organic matter; corrosive for metals
Virkon®	Reasonable care necessary	
Sodium hydroxide	Caustic for eyes and skin	Avoid contact with strong acids; cannot be used with aluminium or alloys (aircraft)
Sodium carbonate	Mildly caustic for eyes and skin	Avoid use with aluminium and alloys (aircraft)
Hydrochloric acid	Toxic for eyes, skin and respiratory tract	Corrosive; avoid contact with strong alkalis

Glutaraldehyde	Avoid contact with eyes and skin	Toxic to all living tissues
Formalin solution	Releases toxic gas; irritating for mucous membranes	Toxic to all living tissues

6 SOURCE OF FOOD SUPPLIES

6.1 Background

The potential for introduction to Antarctica of disease causing agents with food products is recognised by the Antarctic Treaty System. In response, the Madrid Protocol includes the requirement to inspect dressed poultry for evidence of disease, such as Newcastle disease, tuberculosis and yeast infection, before it is packaged for shipment to the Antarctic Treaty area. The Protocol does not specify the type of inspection required. The Protocol also requires that non-sterile soil should not be imported to Antarctica to the maximum extent practicable. Vegetables sent to Antarctica often have non-sterile soil associated with them.

It is not for this group to specify the details of meat industry inspection. Procedures are established and enforced by appropriate authorities in each country and the World Health Organisation, the World Trade Organisation and the Office International des Epizooties (OIE) advises on some international aspects of standards. However, it is important that meat that would not be accepted by other markets is not sent to Antarctica. Normal meat food industry inspection standards should be applied and may include,

1. procedures to detect abnormal signs or death rates during animal production (the producer will have commercial reasons for establishing such procedures),
2. procedures to notify unusual disease during production (some diseases must be reported, such as those on the OIE lists),
3. antemortem inspection to ensure that each batch is in good health before slaughter,
4. inspection of carcasses and meat products for signs of disease,
5. inspection and registration of abattoirs, meat processing and packing establishments to ensure sanitary conditions,
6. procedures for certification, documentation and labelling of meat and meat products.

Meat and all other animal products intended for human consumption sent to Antarctica should pass inspection to the standard normally applied for domestic consumption within the country or to the highest export standard achievable within the country by the meat processing industry, whichever is the higher. Meat and animal products that are not acceptable, for sanitary reasons, for consumption within the country or for export should not be sent to Antarctica.

Meat and animal products sent to Antarctica should be procured from industry certified suppliers with documented quality assurance procedures covering the entire supply chain from primary producers, through slaughter and meat processing to the wholesale and retail outlets. These quality assurance procedures should satisfy all the domestic sanitary regulations, established to reduce transfer of disease causing agents,

of the country sending the products to Antarctica or the highest export standards achievable by the meat industry in the country, whichever is the higher.

6.2 Action required

Managers of national Antarctic programs, members of the International Association of Antarctica Tourism Operators, other tourism operators arranging visits to the Antarctic Treaty area and all others organising visits to the Antarctic region should be asked to ensure that meat and other animal products intended for human consumption in Antarctica should,

1. be procured from industry registered suppliers with documented quality assurance procedures that satisfy standards for domestic consumption, or the highest export standards achievable by the meat industry in the country, whichever is the higher,
2. pass inspection to the standard normally applied for domestic consumption within the country or to the highest export standard achievable within the country by the meat processing industry, whichever is the higher.

In addition, Antarctic operators, whether operators of national programs or tourist operators, should take steps to ensure that they are aware of animal disease outbreaks occurring within the area from which they procure meat and meat products. The Office International des Epizooties (OIE, the world organisation for animal health) web site (http://www.oie.int) is the definitive source for information on notifiable animal diseases. Operators should ensure that susceptible meat and meat products are not sourced from the area designated at risk for any notified disease outbreak.

7 WASTE MANAGEMENT, SEWAGE TREATMENT AND EFFLUENT DISPOSAL

7.1 Background

The Antarctic Treaty System recognises the potential for transfer of pathogens to Antarctic wildlife from waste generated by Antarctic activities. The Madrid Protocol addresses the risk in Annex II, Conservation of Fauna and Flora, Annex III, Waste Disposal and Waste Management, and Annex IV, Prevention of Marine Pollution.

Annex II, Conservation of Flora and Fauna, requires that domestic plants and laboratory animals, plants and micro-organisms brought to Antarctica under a permit, and any poultry or parts not consumed, should be disposed of by incineration or equally effective means that eliminates risk to native fauna and flora.

Annex III, Waste Disposal and Waste Management, requires that residues of carcasses of imported animals, laboratory cultures of micro-organisms and plant pathogens, and introduced avian products should be removed from the Antarctic Treaty area by the generator of the wastes, unless incinerated, autoclaved or otherwise treated to be sterile. Sewage and domestic liquid wastes may be discharged directly into the sea untreated (if the summer station population averages less than 30) or after maceration. The by-product of sewage treatment by the rotary biological contacter process or similar may be disposed of into the sea.

Annex IV Prevention of Marine Pollution, permits disposal of food wastes into the sea no less than 12 nautical miles from the nearest land or ice-shelf after the waste has been passed through a comminuter, provided the ground waste can pass through a screen with openings no greater than 25mm.

Infectious Newcastle disease virus has been recovered from meat after 250 days at –14°C to –20°C and from skin and bone marrow after 250 days at –4°C (Asplin 1949). Viable virus remains in the carcase until decomposition is well advanced. It is stable in non-putrefying tissue and organs or faeces if not exposed to high temperatures and has been isolated from bone marrow held for several days at 30°C (Omojola and Hanson 1986). Frozen meat products have been a significant means of spread of Newcastle disease virus when uncooked poultry scraps have been fed to poultry. Packaging and the drip that develops during storage can also be contaminated with virus from infected carcasses (Lancaster and Alexander 1975).

Minimum core temperatures to kill avian influenza and Newcastle disease viruses in poultry are,

- 70°C for a minimum of 30 minutes
- 75°C for a minimum of 5 minutes
- 80°C for a minimum of 1 minute

Activities associated with a greater risk of exposing Antarctic wildlife to potential pathogens in waste food include,

1. Feeding food scraps to Antarctic wildlife.
2. Allowing scavengers, such as skuas, access to kitchen and field camp waste stored in garbage bags.
3. Thawing frozen meat and meat products in kitchen sinks and disposing of the melt water on to land or to the sea via the sewage treatment system.

7.2 Action required

Feeding of food scraps to Antarctic wildlife is the most direct means by which pathogens could be introduced by people and should be explicitly prohibited.

Kitchen and field camp waste should be stored at all times in secure containers designed to prevent access by scavengers. As a precaution, uncooked waste meat and meat scraps should be boiled for 20 minutes before disposal if there is any chance that scavengers can feed on the scraps.

Melt water produced from thawing meat and meat products should be boiled before disposal to domestic sewage systems that discharge effluent to the Antarctic environment.

8 RESEARCH PRIORITIES

8.1 Background

Relatively little is known about disease and disease processes in Antarctic wildlife. Available information indicates that Antarctic wildlife species carry a diversity of

potential pathogens and display immune reactions to many other disease causing agents that have not yet been isolated. Beyond the intrinsic scientific value of providing greater understanding of an aspect of Antarctic ecology, the practical benefits of research are that it may provide information to reduce the likelihood of human introduction or spread of disease causing agents, and that it may provide information to help explain the cause of disease events.

The results of research to reduce the likelihood of a human mediated disease event will be used to improve practical measures to diminish the risk to Antarctic wildlife. For example, if it can be shown that a cleaning technique is not effective at reducing the viability of specific pathogens then the technique could be abandoned. Results of research to help explain the cause of a disease event may be used to reduce the risk to Antarctic operators of adverse public reaction if an unusual mortality occurs. For example, if it can be shown that pathogens associated with an unusual mortality event were common among Antarctic wildlife in locations remote from human activity prior to the event then it may be inferred that people did not recently introduce the pathogen. The growing body of information on immune reactions in Antarctic wildlife is already a valuable resource in this respect.

Questions raised during the process of developing practical measures to diminish risk to Antarctic wildlife that may warrant research include,

1. How well do potential pathogens survive as viable infectious agents in the Antarctic environment?
2. How effective for eliminating potential pathogens are the methods currently used or proposed for cleaning footwear, equipment and vehicles in Antarctic operations?
3. Do current methods of sewage treatment and effluent disposal reduce the risk of disease introduction sufficiently?

Research and other activities that may provide information to help explain disease events includes,

1. Investigation of the spatial and temporal patterns of disease causing agents (including serological evidence) within Antarctic species,
2. Comparison of the type and diversity of disease causing agents among animals that spend their entire life within the Antarctic region and those that migrate to other continents,
3. Development of a tissue bank that in the event of a disease incident could be used to do retrospective analyses for evidence of historic occurrences of disease causing agents.

Most of the research activities identified could be addressed by individual researchers working with the support of national programs without the need for establishing a formal structure within the Antarctic Treaty System or SCAR. The establishment of a tissue bank would benefit from international coordination however it does not follow that the most efficient mechanism would be to establish a single international facility to archive Antarctic material. Most countries involved in Antarctic activities already have properly curated facilities for archiving non-Antarctic animal tissue. At this stage the most efficient mechanism to establish a tissue bank for Antarctic animal

tissue would be to develop cooperative arrangements with established archival facilities. Information on Antarctic material held by archival facilities could be made available using established Antarctic Treaty System processes for scientific data management and data exchange.

8.2 Action required

Request SCAR to endorse the research priorities and other activities identified above and to disseminate these to SCAR representatives and to appropriate SCAR Working Groups.

Request the Joint Committee for Antarctic Data Management to advise on the development of procedures for sharing access to information on tissues stored in archival facilities located in different countries.

9 REFERENCES

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