

## Non-native Species Issues Challenges of International Approach in the Antarctic context

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## Invasive alien species (IAS):

Alien species (= non-native) : species occurring by human agency in an ecological area where it is not native

Invasive alien species: an alien species which becomes established in natural or semi-natural ecosystems or habitat... and threatens native biological diversity”.



Alien species

## All taxonomic groups have produced invasive alien species – and all ecosystems at risk



## Some Arctic and Subantarctic examples:

Sub-  
Antarctic

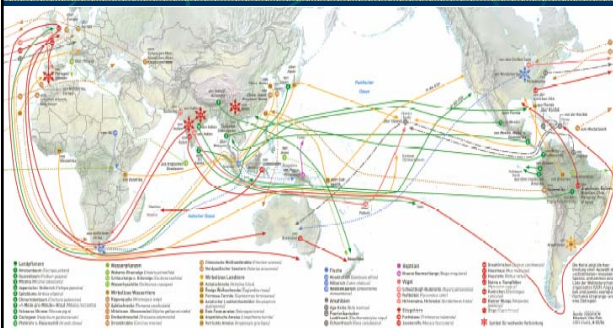


Arctic



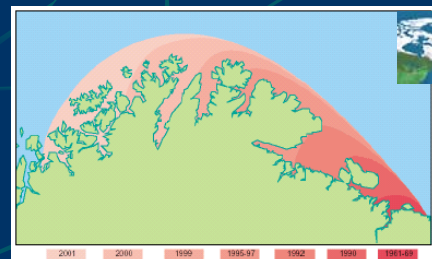
Photo: P. McLelland, DOC

## Distance is not necessarily a barrier



GEO Magazine

## High latitude is not necessarily an impediment



Evolution of the Red King Crab distribution in the Barents Sea since its introduction in the 1960s until 2001.

Source: Institute of Marine Research, Norway

*Paralithodes camtschaticus* Introduced from North Pacific to Barents Sea

Also note:  
time lag!



## Non-native organisms in Antarctica

- Past intentional introductions, and some practices (e.g. feeding birds)... a certain degree of risk – and not always in compliance.
- Environmental protocol – covers intentional introductions, and a few pathways for unintentional ones (e.g. poultry, soils..)
- But need to deal with unintentional introductions now



## Unintentional introductions – some issues

- Some sites in the Antarctic with thermal activity (e.g. Deception)
- Local temperature already increasing (e.g. Rothera)
- “Polar connections” to Arctic via
  - Icebreakers
  - Research ships
  - Aircraft
  - Equipment
  - Fishing fleets
- “Subantarctic connections”
- “Fast” connections



## Non-native survival in Antarctica

- Theoretically possible for alien algae to survive (Broady 1994)
- Live non-native invertebrates (mite, fly larvae and adult, earthworms..) found in discarded soil in Schirmacher Oasis (Lewis-Smith pers comm)
- *Poa trivialis* found near Syowa (Japan 1996)
- “grass” in Vestfold Hills, including new seedlings
- *Poa annua* expanding around Arctowski (Olech 1996)
- Individuals of North Atlantic crab found in Peninsula (Tavares & De Melo 2004)



## Antarctic Conclusion (1)

- Non-native species issue is relevant to the Antarctic
- Many different actors contribute to the potential pathways – including fisheries, tourism, scientists, logistics, recreational
- Many “routes”

### Challenge:

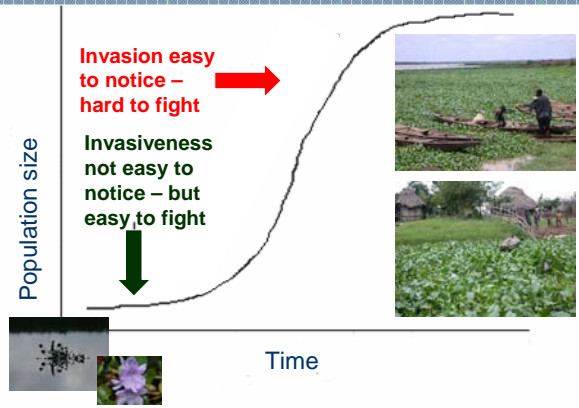
- Need to include all ‘routes’ in mitigation
- Need to include all actors in measures, including through CCAMLR as well as ATCM
  - Need all actors to understand the issue but some actors are more enlightened than others

Vast majority of alien species do not become invasive – but those that do are – globally - one of the main threats to biodiversity



Giant house mice impact on Tristan da Cunha island (S Atlantic)

## General progress from introduction to invasion Time lags



## ATS Conclusion (2)

Non native species in Antarctica:

- 1) Prevention!
- 2) Early detection rapid response
- 3) Consider guilty until proven innocent

Advantage in ATS : Annex II permit requirement for intentional introductions → very good basis for this approach



## ATS Conclusion (2)

### Challenges:

- Potential threats not always understood → need for precaution not always taken seriously enough → need more understanding and awareness
- How best cover unintentional introductions / pathways (what are they? What action needed?)
- How can we detect / survey/ do surveillance properly given the size of Antarctica and the limited resources – especially in the marine environment? Who should pay?



## ATS Conclusion (2)

### Challenge:

- What about alien species already in the wild – Environmental Protocol does not currently require removal...
- .....but does not inhibit it either
- Removal may require biocide use – how do this properly (EIA issues? contingency planning?)
- If possible, should removal in Antarctic be done?
  - Remove vs study
  - Educational role of removal

## Secondary introductions:



Ruddy Duck *Oxyura jamaicensis* deliberately introduced in UK but now threatening White-headed Duck *Oxyura leucocephala*, a globally endangered species - in SPAIN.

Triggered regional European response

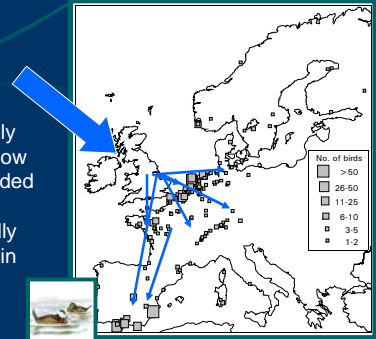


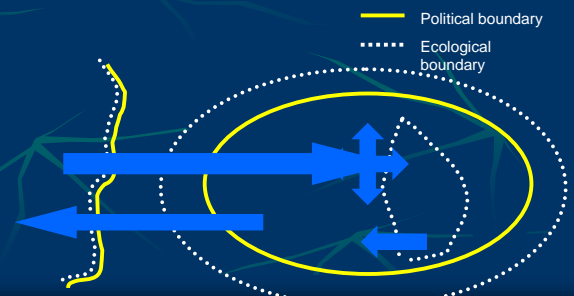
Figure. Distribution of Ruddy Ducks recorded in mainland Europe, 1965-1996(Hughes *et al.*, 1999)

Once introduced, spread and even secondary introductions can take place either intentionally, through “hitch-hiking”, or through “natural” means (wind, wings, feet, seed dispersal etc)...



## Alien species – crossing ecological boundaries, not political ones...

- Includes within Antarctic introductions
- Antarctic can be “donor” as well as “receiver”



### ATS Conclusion (3)

Dealing with non-native species needs to include:

- Avoiding spread and secondary introductions
- Within Antarctic introductions (from a location where species is native to a location where it is not)
- Possible introduction FROM Antarctica to elsewhere (ballast water e.g. - Lewis et al 2005)

Challenge:

- Goes beyond Annex II ?
- Needs close cooperation with other entities (IMO, ICES,...)



### ATS Conclusion (3)

- Joint international approach required

Advantage: ATS exists and effective

Challenge:

- consensus decision works on lowest common denominator → risk that the least enlightened prevail?
- Parties with domestic expertise in alien species issues should continue to lead and set examples

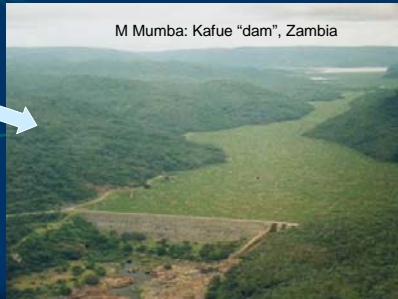
Stopping the aliens: what are we doing about it?

The Australian Antarctic Division has implemented two major changes in the way it processes the cargo area has been moved from the ship's hold to a container in the cargo hold. This is the first time since the Antarctic Treaty that the Division has taken such a high profile initiative to improve the way it handles cargo. The changes have had a substantial impact on reducing the risk of alien species introduction to the continent through Antarctic cargo operations.



### Role of awareness

It is difficult for an individual to understand consequences that are far away and maybe in the future



M Mumba: Kafue "dam", Zambia

### Role of awareness

NZ: Kaimanawa wild horses impact native plants but animal rights advocacy and politicians interfered with management



### ATS Conclusion (4)

- Perception and understanding has major influence on alien species issues
- Understanding can change attitudes
- Awareness raising and education on are critical



### ATS Conclusion (4)

Advantage : awareness is growing

Challenge:

- awareness needs to be widespread (consensus decision making → all Parties to ATS, other actors
- Awareness efforts need to "catch" everybody (from Base mechanic to Treaty diplomat...)



## Other Antarctic Values

- Intrinsic value, “pristineness”
- Wilderness value
- Present and future science value

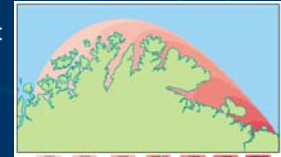


require a much lower threshold of tolerance for alien species – including those that may not be detrimental to Antarctic wildlife.



## Possible future issue: conflict of interest?

“The impressive crabs were on display at an event hosted by the Norwegian Seafood Export Council at the up-market Knightsbridge restaurant One-O-One which has been serving its customers Norwegian red king crab for several years.”



Evolution of the Red King Crab distribution in the Barents Sea since its introduction in the 19th century. Source: Institute of Marine Research, Norway



## ATS Conclusion (5)

### Challenge:

- Non-native species issues go beyond Annex II – maybe non-native species should be a cross cutting agenda item...?
- Avoid future development of “alien supporters”!



From: UNEP/CBD/SBSTTA/11/7/Add.1 31 August 2005 IMPLICATIONS OF THE FINDINGS OF THE MILLENNIUM ECOSYSTEM ASSESSMENT FOR THE FUTURE WORK OF THE CONVENTION (Addendum)

	Climate change	Ocean acidification	Stratospheric ozone depletion	Land use change	Population growth	Globalization
Forest	↓	↑	↓	→	↑	↑
Temperate	↓	↑	↓	→	↑	↑
Tropical	↓	↑	↓	→	↑	↑
Temperate grassland	↓	↑	↓	→	↑	↑
Mediterranean	↓	↑	↓	→	↑	↑
Dryland	↓	↑	↓	→	↑	↑
Tropical grassland and savanna	↓	↑	↓	→	↑	↑
Desert	↓	↑	↓	→	↑	↑
Inland water	↓	↑	↓	→	↑	↑
Coastal	↓	↑	↓	→	↑	↑
Marine	↓	↑	↓	→	↑	↑
Island	↓	↑	↓	→	↑	↑
Mountain	↓	↑	↓	→	↑	↑
Polar	↓	↑	↓	→	↑	↑

RESULT OF PAST EVOLUTION: Driver's impact on biodiversity over the last century. Legend: Low (Green), Moderate (Yellow), High (Orange), Very high (Red). DRIVING FORCES: Decreasing impact (Green), Continuing impact (Yellow), Increasing impact (Orange), Very high impact (Red).

Polar: impact relatively low compared to other areas of world  
may lead to complacency  
Opportunity to be proactive

## Finally...

- Global lesson: Biggest challenge often is institutional cooperation.
- ATS is in a good position to deal with non-native issues - but will need to be open to work with and/or learn from other entities

