

# Disease emergence and spread related to wildlife trade: aquatic species

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## Introductions of aquatic animals diseases due to international trade

Introduction of new diseases of aquatic animals into a country most commonly occurs through importation of live aquaculture animals but also animals derived from wild populations

The introduction of 'exotic' pathogens into countries is a major reason for major epizootics in farmed and wild populations of aquatic animals.

## Selected examples of international spread of diseases of aquatic wildlife

- Spring viraemia of carp
- Gyrodactylosis of Atlantic salmon
- Crayfish plague
- Ranavirus infections of amphibians
- Chytridiomycosis of amphibians

# Spring viraemia of carp in the UK

# Outbreaks of Spring Viraemia of Carp in UK

- High mortalities, loss of stock.
- Loss of business, anglers reject
- Cost of eradication
- Environmental/Ecological damage



SVC virus



# SVC disease confirmed in UK

Supervised site clearance and disinfection



3 years of testing before declared free

High costs involved

Some outbreaks linked to illegal imports

# Illegal trade (smuggling) in live wild fish

Illegal Import of 1 Tonne of Roach and Bream from Holland (March 2002)



Reason for such illegal imports?

Angling is a very popular sport and many anglers want to catch large 'specimen' fish.

Commercial sport fisheries often want to enhance their stocks of fish to attract publicity and increase business.

There can be temptation to buy large wild fish from dubious dealers, including fish imported illegally from other countries where SVC is endemic and fish are much cheaper.

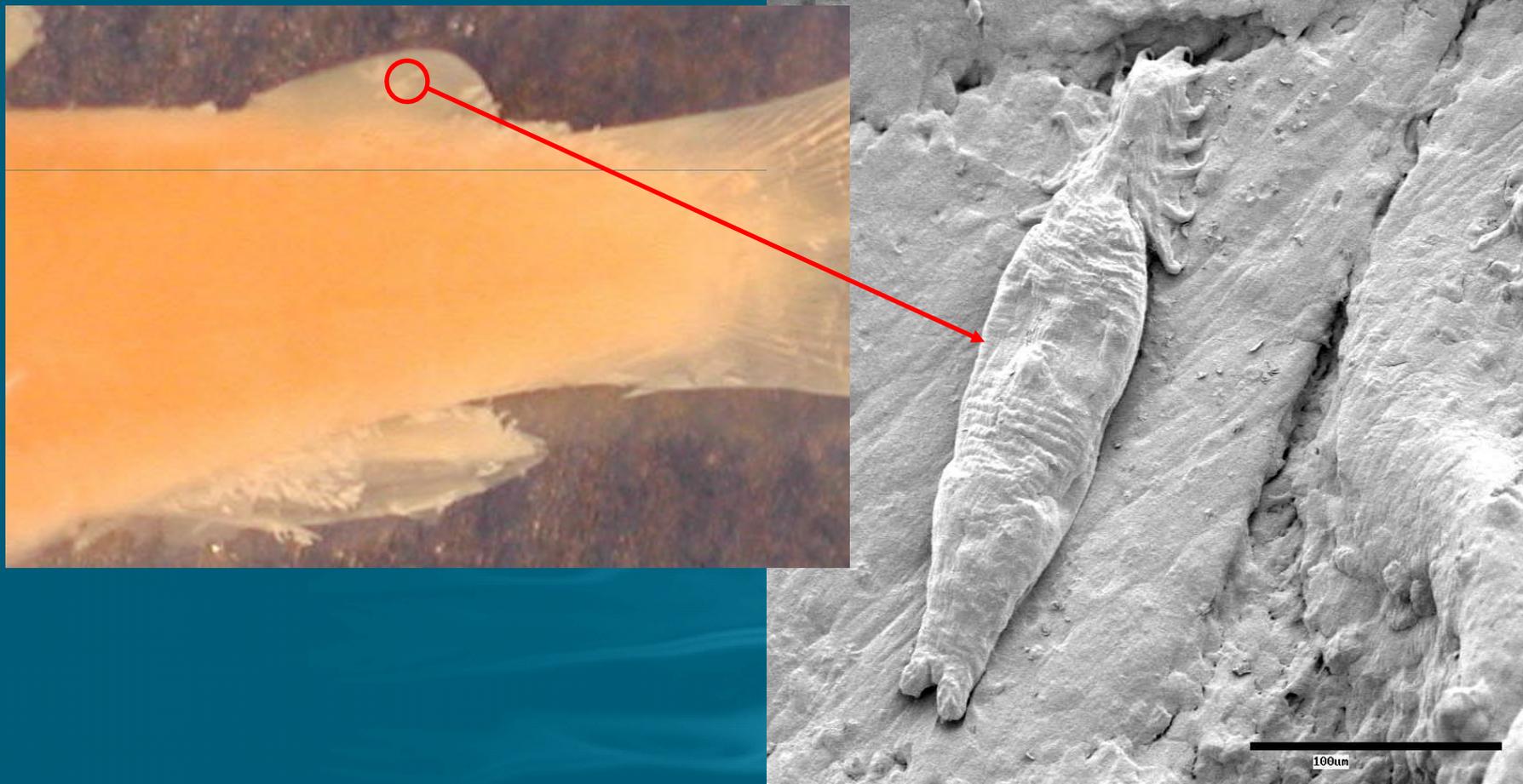
Atlantic salmon sport fishing is also popular  
and subject to stock enhancement of rivers  
in some countries

Wild salmon enhancement programmes are normally restricted to government agencies rather than carried out by the private sector but this does not necessarily provide protection against disease introduction.

In Norway, catastrophic losses of wild Atlantic salmon populations occurred following the introduction of the parasite *Gyrodactylus salaris* into the country, probably as a result of official importations of juvenile salmon for river stock enhancement efforts.

# *Gyrodactylus salaris*

- Difficulty in identification, x 400 species.
- Threat to wild salmon populations rather than farmed salmon.
- Use of Rotonone has been tried in Norway to eradicate it





Transfer of *G. salaris* from Baltic river salmon to Atlantic river salmon via imported juvenile salmon for restocking.

Subsequently spread to many rivers in Norway before problem realised

(Note: arrows only illustrative, not geographically precise.)

Over the years following the introduction of *G. salaris* to the country, catastrophic losses of Atlantic salmon were seen in Norway.

*G. salaris* eradication programme has been in progress for many years in Norway and some rivers are now free, but at great cost.

# Crayfish plague throughout Europe

Historical trade of live freshwater crayfish from the North America to Europe for human consumption, and later for farming, has led to the introduction and widespread distribution of the devastating fungal disease crayfish plague of wild native species.



Native crayfish



Signal crayfish

Photos courtesy of Birgit Oidtmann

## Mass mortalities caused by crayfish plague



Photo courtesy of Birgit Oidtmann

European rivers are now widely affected and native crayfish populations are in decline in many areas.

One native crayfish species has recently been re-classified from 'vulnerable' to 'endangered' in the IUNC Red List of Threatened Species.

# Diseases of amphibians

Infection with ranavirus

Infection with *Batrachochytrium dendrobatidis*  
(Chytridiomycosis)

# Ranavirus infection in amphibians

# Examples of epidemics of ranavirus disease in wild amphibian populations

## BRITAIN

1992 - On-going

common frog (*Rana temporaria*)  
common toad (*Bufo bufo*)

## CANADA

Saskatchewan

1997

tiger salamander  
(*Ambystoma tigrinum*)

## U.S.A.

Arizona

1995

Sonoran tiger salamander  
(*A. tigrinum stebbinsi*)

N. Dakota

1998

tiger salamander (*A. tigrinum*)

Maine

1998

tiger salamander (*A. tigrinum*)

Utah

1998

tiger salamander (*A. tigrinum*)

# Epidemics of ranaviral disease in wild amphibian populations

## ARGENTINA

N.W. Patagonia

<2001 - On-going

Leptodactylid frog  
(*Atelognathus patagonicus*)



Are imports of live amphibians the cause of emergence and spread of ranaviruses ?

There has been a very large international trade in amphibians for the pet industry over the past few decades.

From the data published by Schlaepfer et al. (2005) it has been estimated\* that the global trade in amphibians for pets is greater than 6,000,000 individuals per annum.

Moribund and dead animals are often present in consignments on arrival.

\* OIE Ad hoc Group on Amphibian Diseases (2006)



Imports of amphibians into UK for the pet trade were sampled at a border inspection post.

Several consignments from different continents were found to be infected with ranavirus.

Ranavirus infections were confirmed in consignments of frogs originating from:

Africa

Central America

North America

Asia

There have been other detections of ranavirus in ornamental amphibians imported into Europe

In June 2004, mass mortality occurred in red tailed knobby newts imported into Belgium probably from Asia (China ?).

(Pasmans et al., 2008. The Veterinary Journal, 176, 257-259)

So, international trade in live amphibians, many of which are from wild populations, is causing global spread of ranaviruses

# Chytridiomycosis

Associated with mass mortalities and amphibian population declines globally and possibly contributing to the extinction of some species.

The source and possible route  
of international spread of chytridiomycosis?

Historical international trade in wild-caught *Xenopus* frogs from Africa from mid-1930s for human pregnancy testing and for scientific studies has distributed them worldwide.

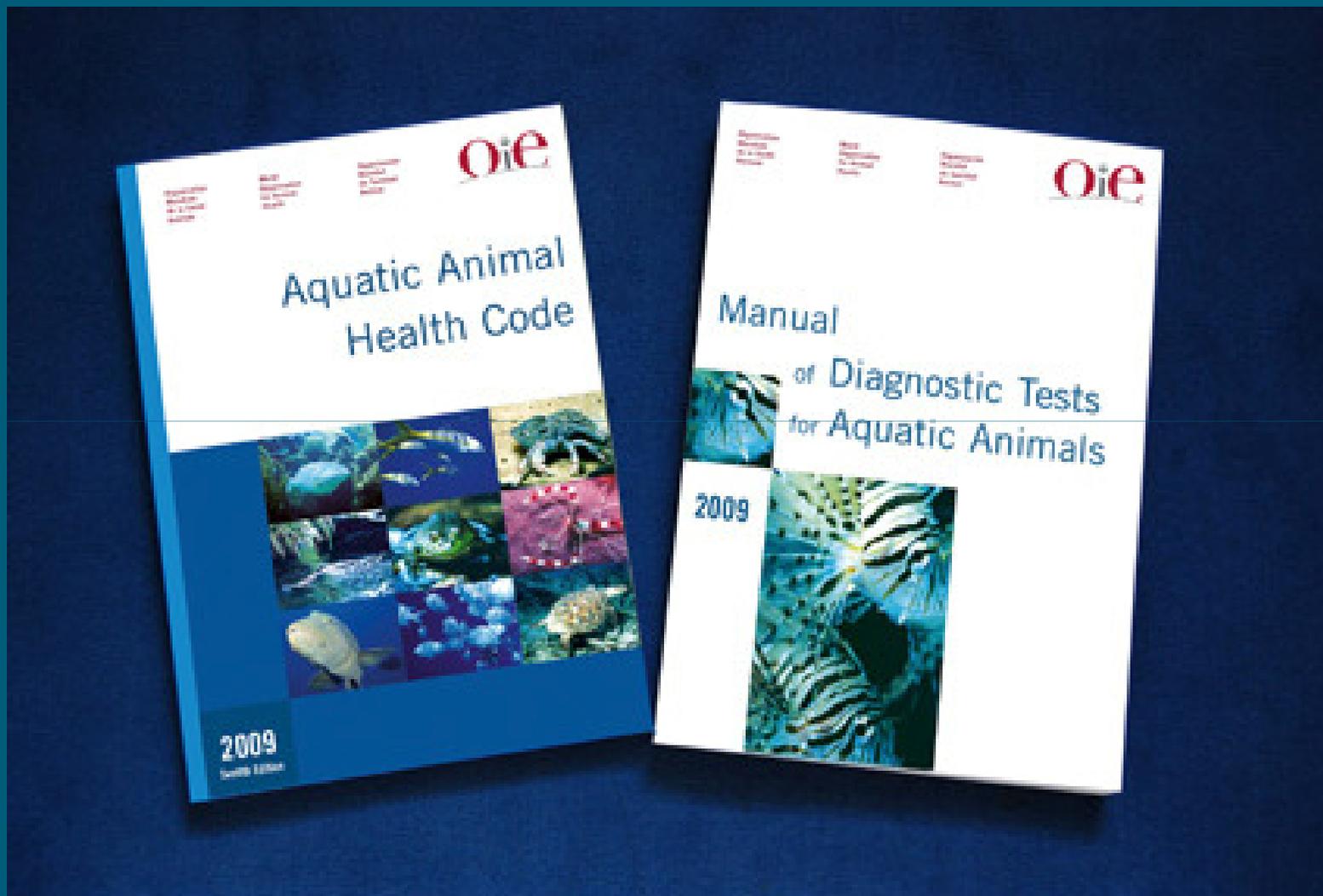
# Chytridiomycosis: out of Africa?

Weldon et al. (2004). Emerging Infectious Diseases Vol. 10, No 12

So, there are numerous examples of serious diseases being spread internationally through trade of wild aquatic animals.

It is clear that without effective implementation of national and international bio-security measures, the occurrence, trans-boundary spread and serious economic and/or ecological impact of aquatic animal diseases will continue.

Globally agreed standards for sanitary measures to apply to international trade in live aquatic animals are laid out in the **OIE Aquatic Animal Health Code** and in the **OIE Manual of Diagnostic Tests for Aquatic Animals**.



## OIE Aquatic Animal Health Code

The aim of the **Aquatic Animal Health Code** (Aquatic Code) is to assure the sanitary safety of international trade in live aquatic animals (fish, molluscs, crustaceans and amphibians) and their products.

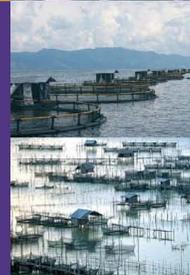
This is achieved through the detailing of health measures to be used by the competent authorities of importing and exporting countries to prevent the transfer of agents pathogenic for aquatic animals or humans, while avoiding unjustified trade barriers.

## OIE Diagnostic Manual for Aquatic Animals

The purpose of the **Manual of Diagnostic Tests for Aquatic Animals** (Aquatic Manual) is to provide a uniform approach to the detection of the diseases listed in the Aquatic Code, so that the requirements for health certification in connection with trade in aquatic animals and aquatic animal products can be met.

Detailed OIE guidance on surveillance  
for aquatic animal diseases is also available

*Guide for Aquatic  
Animal Health  
Surveillance*



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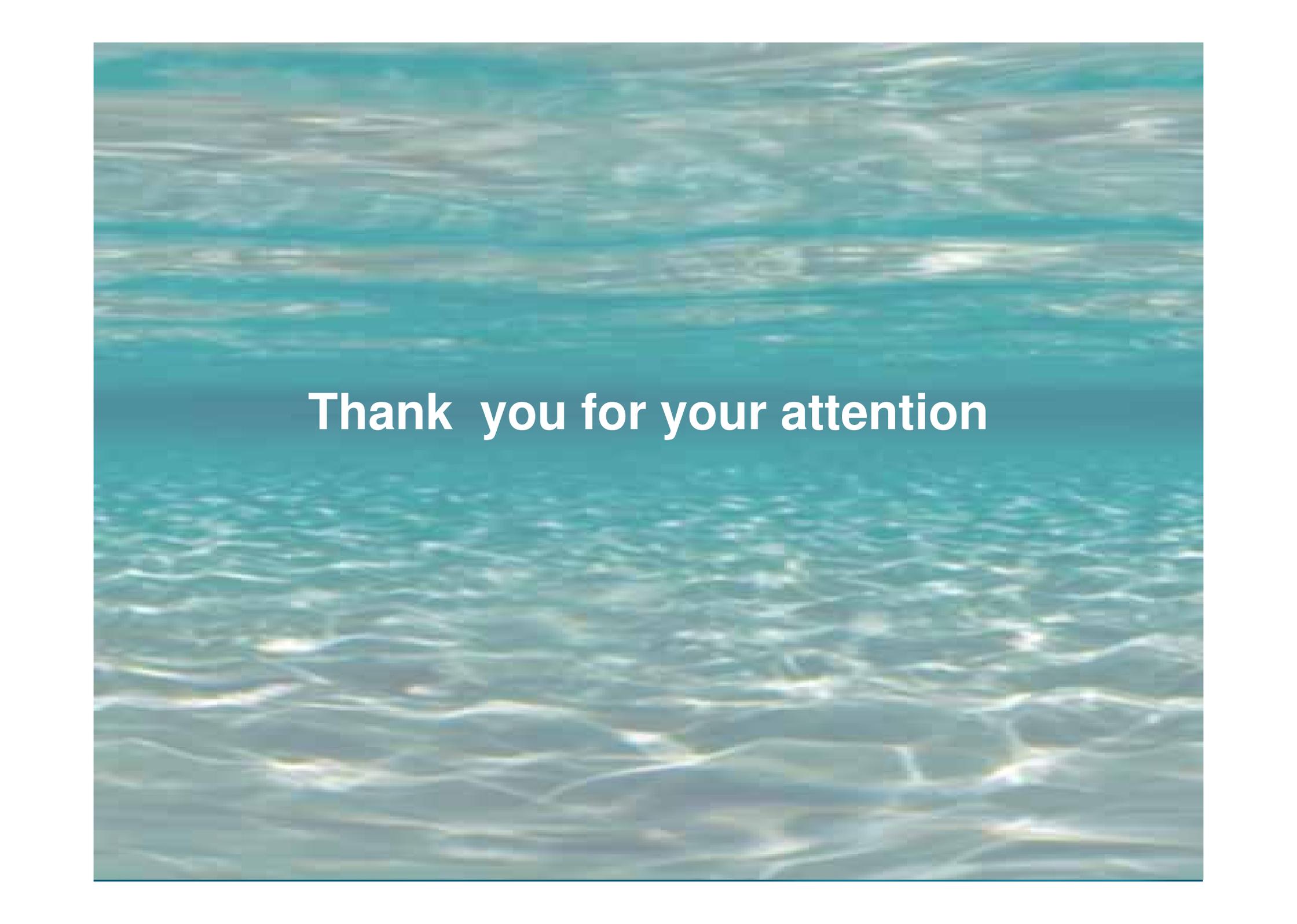
## In conclusion

There are clear risks of emergence and spread of aquatic animal diseases associated with international trade in aquatic wildlife.

Much of this international trade is currently unregulated by trading countries in terms of health safeguards.

OIE standards and guidance are available to greatly reduce the disease risks.

All that is needed is for national governments, international regulators and traders to enforce them.



**Thank you for your attention**