

Surveillance and preparedness on AA diseases

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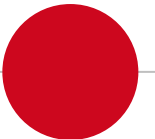
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● Objectives of this presentation

- Summarize WOAAH rules for efficient surveillance system for AAD (Chapters 1.4; 4.1; 4.2; 4.3)
- Describe different pathways for disease-freedom self-declaration (Chapter 1.4)
- Briefly compare WOAAH rules for surveillance with the European ones (AHL- reg 2016/429)

● Definition

SURVEILLANCE

- means a systematic series of investigations of a given population of aquatic animals to detect the occurrence of disease for control purposes, and which may involve testing samples of a population

SCOPE OF SURVEILLANCE

- **Identify the presence** of a given disease
- **Define the prevalence** of a given disease
- **Provide freedom** from a given disease

TYPE OF SURVEILLANCE

- Passive
- Active or Targeted

● Efficient surveillance system

Basic biosecurity conditions:

- Early detection system
- Capacity and expertise to investigate disease events
- Appropriate diagnostic capability
- Chain of command

Aquaculture personnel



The veterinarian



The competent authority



The laboratory



The competent authority



● Territorial scope

Zone is as an area in one or more countries containing an **aquatic animal population** with a specific aquatic animal **health status with respect to a disease**.

For aquatic animal diseases, a zone can be a contiguous hydrological system such as:

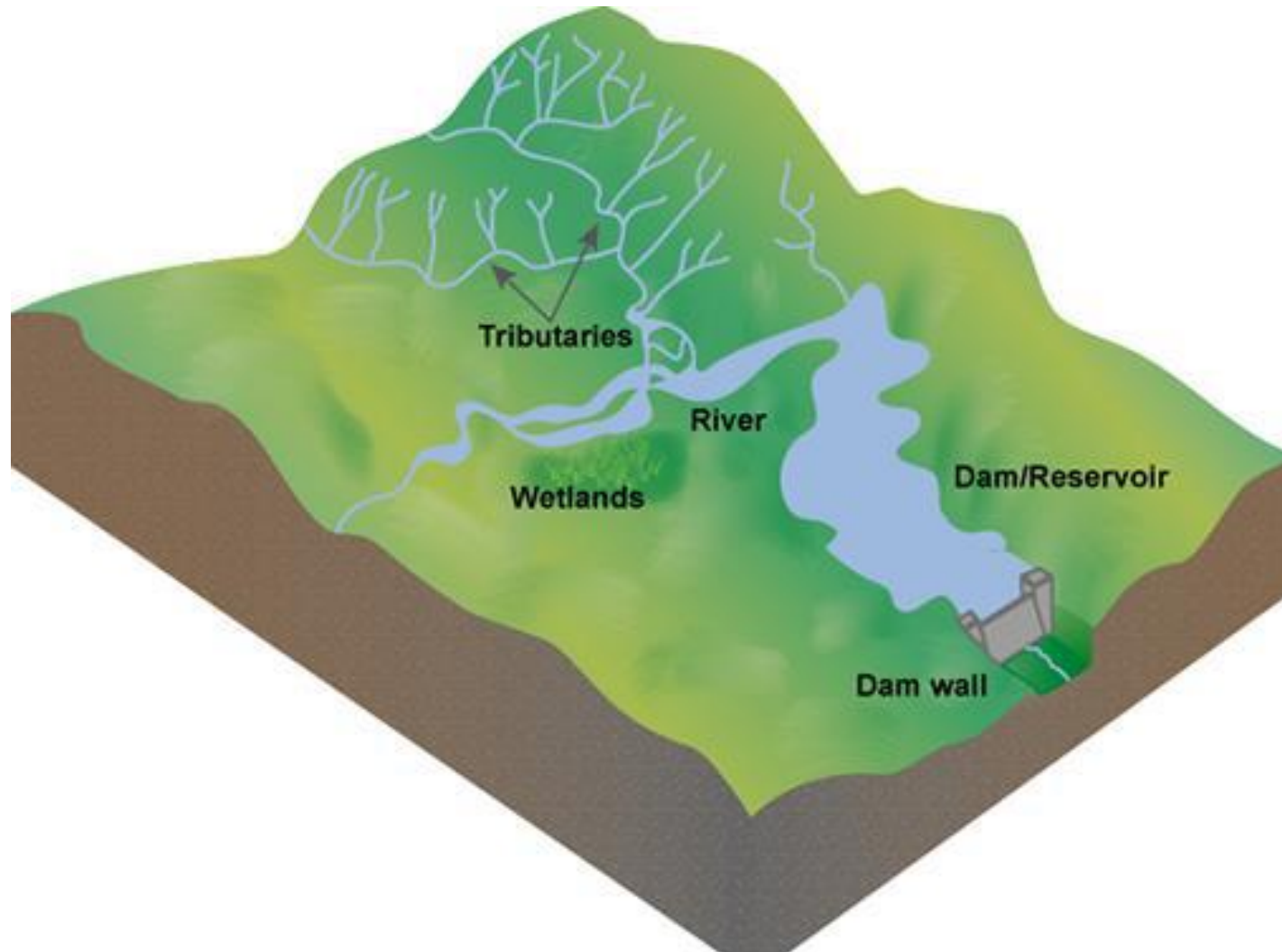
● Zone for AA-1

- an entire water catchment from the source of a waterway to the estuary or lake
OR more than a water catchment;



● Zone for AA-2

- part of a water catchment from the source of a waterway to a barrier (waterfalls, dams, barriers) that prevents the introduction of a specific disease or diseases;



● Zone for AA-3

- part of a coastal or area an estuary with a precise geographical delimitation;



● Territorial scope

Compartments are defined as one or more aquaculture establishments under a **common biosecurity management system**, provided that the farmed animals have a distinct health status with respect to a specific disease or diseases.

Factor to be considered:

- ✓ Physical or spatial factors that affect the status of biosecurity in a compartment
- ✓ Infrastructural factors
- ✓ Biosecurity plan
- ✓ Traceability system

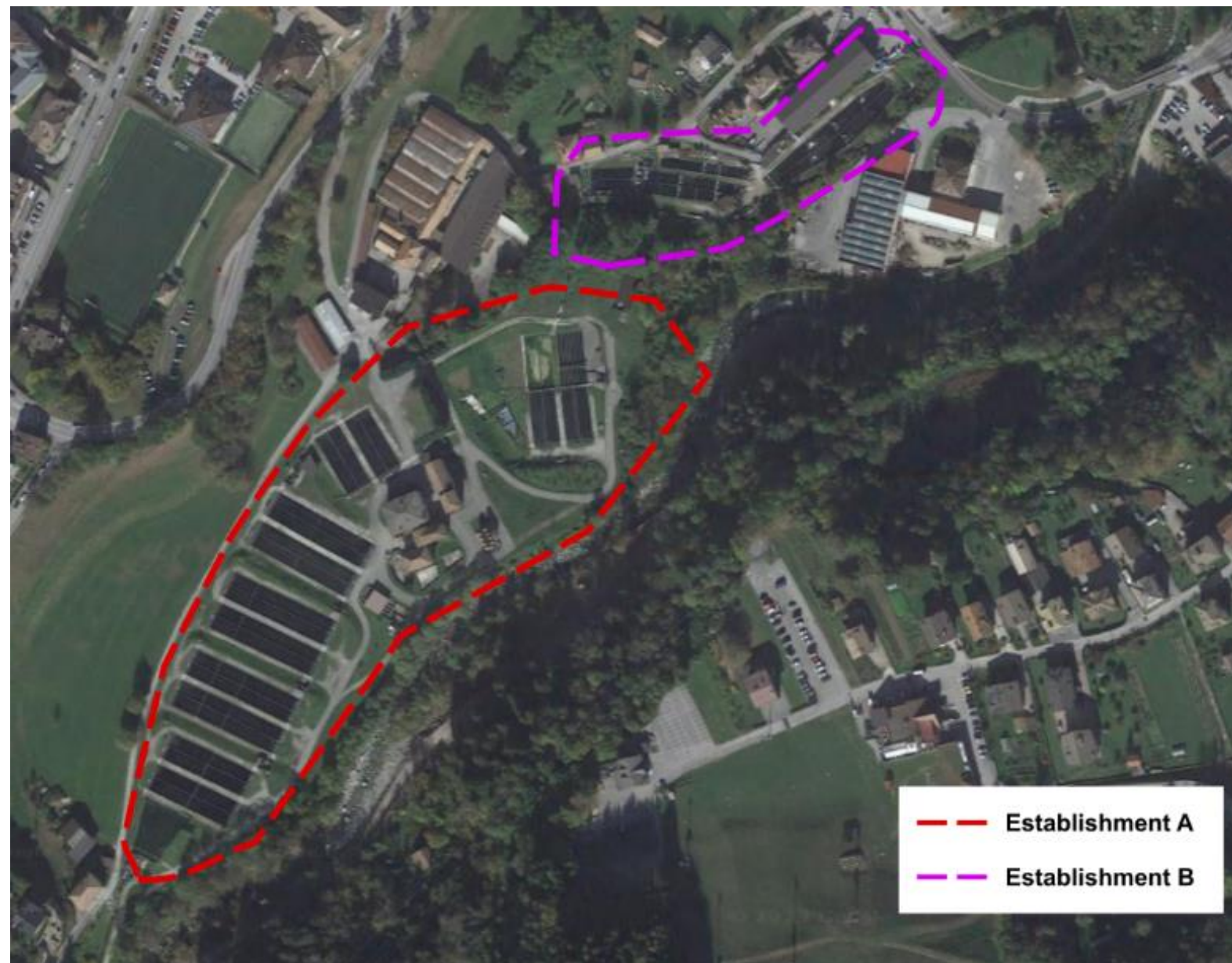
● Compartment composed by single establishment

- ✓ Independent water source
- ✓ Infrastructure
- ✓ Biosecurity



● Compartment composed by more than one establishment

- ✓ Independent water source
- ✓ Similar health status
- ✓ Infrastructure
- ✓ Common biosecurity



● Disease of interest

- **SUSCEPTIBLE SPECIES:** means species of aquatic animals that **have been demonstrated as susceptible** to infection with a specific pathogenic agent, in accordance with the following criteria (chapter 1.5):
 - the pathogenic agent is multiplying in the host, or developing stages of the pathogenic agent are present in or on the host;
 - viable pathogenic agent is isolated from the proposed susceptible species, or infectivity is demonstrated by way of transmission to naive individuals;
 - clinical or pathological changes are associated with the infection;
 - the specific location of the pathogenic agent corresponds with the expected target tissues.
- **VECTOR:** means any living organism that has been demonstrated to **transmit a pathogenic agent to susceptible species**. Susceptible species are not considered as vectors for a specific pathogenic agent.

Target species

- Lists of susceptible species for each disease are reported in the dedicated chapter of the **Manual of Diagnostic Tests for Aquatic Animals** (available online <https://www.woah.org/en/what-we-do/standards/codes-and-manuals/#ui-id-4>)

2.2.1. Susceptible host species

Species that fulfil the criteria for listing as susceptible to infection with EHNV according to chapter 1.5 of *Aquatic Animal Health Code (Aquatic Code)* are:

Chapter 2.3.2. – Infection with epizootic haematopoietic necrosis virus

Family	Scientific name	Common name
Esocidae	<i>Esox lucius</i>	Northern pike
Galaxiidae	<i>Galaxias olidus</i>	Mountain galaxias
Ictaluridae	<i>Ameiurus melas</i>	Black bullhead
Melanotaeniidae	<i>Melanotaenia fluviatilis</i>	Crimson spotted rainbowfish
Percidae	<i>Perca fluviatilis</i>	European perch
	<i>Sander lucioperca</i>	Pike-perch
Percichthyidae	<i>Macquaria australasica</i>	Macquarie perch
Poeciliidae	<i>Gambusia holbrooki</i>	Eastern mosquito fish
	<i>Gambusia affinis</i>	Mosquito fish
Salmonidae	<i>Oncorhynchus mykiss</i>	Rainbow trout
Terapontidae	<i>Bidyanus bidyanus</i>	Silver perch

2.2.2. Species with incomplete evidence for susceptibility

Species for which there is incomplete evidence to fulfil the criteria for listing as susceptible to infection with EHNV according to chapter 1.5 of the *Aquatic Code* are: none known

In addition, pathogen-specific positive polymerase chain reaction (PCR) results have been reported in the following species, but an active infection has not been demonstrated: Atlantic salmon (*Salmo salar*), freshwater catfish (*Tandanus tandanus*), golden perch (*Macquaria ambigua*), Murray cod (*Maccullochella peelii*) and purple spotted gudgeon (*Mogurnda adspersa*).

Diagnostic methods

- Each disease has its own diagnostic methods as prescribed in the relevant chapter of the **Manual of Diagnostic Tests for Aquatic Animals**

Chapter 2.3.2. – Infection with epizootic haematopoietic necrosis virus

Table 4.1. WOAHA recommended diagnostic methods and their level of validation for surveillance of apparently healthy animals and investigation of clinically affected animals

Method	A. Surveillance of apparently healthy animals				B. Presumptive diagnosis of clinically affected animals				C. Confirmatory diagnosis ¹ of a suspect result from surveillance or presumptive diagnosis			
	Early life stages ²	Juveniles ²	Adults	LV	Early life stages ²	Juveniles ²	Adults	LV	Early life stages ²	Juveniles ²	Adults	LV
Wet mounts												
Histopathology					++	++	++	1				
Cytopathology												
Cell culture	+	+	++	1	++	++	+++	1	+	+	++	1
Immunohistochemistry					+	+	+	1				
Real-time PCR	+++	+++	+++	1	+++	+++	+++	2	++	++	++	1
Conventional PCR	+	+	+	1	++	++	++	1				
Conventional PCR followed by amplicon sequencing									+++	+++	+++	1
<i>In-situ</i> hybridisation												
Bioassay												
LAMP												
Ab-ELISA			+	1								
Ag-ELISA	+	+	+	1	+	+	+	1				
Other antigen detection methods												
Other methods												

LV = level of validation, refers to the stage of validation in the WOAHA Pathway (chapter 1.1.2); PCR = polymerase chain reaction; LAMP = loop-mediated isothermal amplification; Ab- or Ag-ELISA = antibody or antigen enzyme-linked immunosorbent assay, respectively; IFAT = indirect fluorescent antibody test.

¹For confirmatory diagnoses, methods need to be carried out in combination (see Section 6). ²Susceptibility of early and juvenile life stages is described in Section 2.2.3. Shading indicates the test is inappropriate or should not be used for this purpose.

● Sampling size

Sampling size depend on:

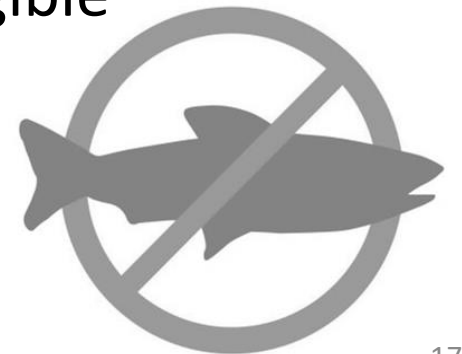
- ✓ Se and Sp of the diagnostic tests
- ✓ Expected prevalence of the disease
- ✓ Level of confidence of the results
and
- ✓ Size of the target population (generally is considered infinite)
- ✓ Desired power of the study

● Pathways for disease-freedom recognition

- 1. Absence of Susceptible species (1.4.11)
- 2. Historical freedom «historical evidence of disease absence» (1.4.12)
- 3. Targeted surveillance «data focused on selected areas» (1.4.13)
- 4. Returning to freedom «after the free status is lost» (1.4.14)

● Pathway 1: Absence of susceptible species

- This pathway can be utilised if it can be demonstrated that no susceptibles species are present at the country/zone level
- No targeted surveillance is required
- Basic biosecurity condition shall be in place from **minimum six month**
- Sufficient knowledge of the aquatic animal fauna (domestic and wild) is necessary
- Documentation providing evidences:
 - ✓ that susceptible species have not been imported
 - ✓ the likelihood of the presence of susceptible species is negligible



● Pathway 2: Historical freedom

- This pathway can be utilised when there are historical evidences of the absence of the disease of interest at the country/zone level
- Based mainly on passive surveillance but could be necessary adding targeted surveillance
- Basic biosecurity condition shall be in place from **minimum 10 years**
- The disease has not been detected for a minimum period that is specified in the relevant disease-specific chapter of the Aquatic code



● Pathway 3: Targeted surveillance

- This pathway can be utilised when there are evidences of the absence of the disease of interest at the country/zone/compartment level
- Targeted surveillance is always required
- Basic biosecurity condition shall be in place from **minimum 1 year**
- The disease has not been detected for a minimum period that is specified in the relevant disease-specific chapter of the Aquatic code



● Pathway 4: Returning to freedom

- This pathway can be utilised when the free status is lost due to the detection of the disease in country/zone/compartment
- Target surveillance is required
- Compartments are able to return freedom relatively rapidly (the minimum period vary according to the disease of interest)
- Zones/countries can request more time to regain freedom
- Actions to be taken:
 - ✓ Depopulation/fallowing/restocking
 - ✓ Contact tracing
 - ✓ Infected zone & Protection zone establishment
 - ✓ Risk based approach

● Maintenance of freedom

- Freedom shall be maintained continuously
- CA should ensure prompt investigation of any health events or other information that may rise suspicion of the occurrence of the listed diseases for which the country/zone/compartment is declared free

● EU regulation

CIR (EU) 2018/1882

Classification of the diseases and list of susceptible and vector species

RD (EU) 2020/689

Surveillance, eradication programmes, and disease-free status

RE (EU) 2020/2002

Union notification and Union reporting

Reg (EU) 2016/429 AHL

DE (UE) 2021/260

Misure nazionali contro malattie acquatiche

RE (EU) 2020/690

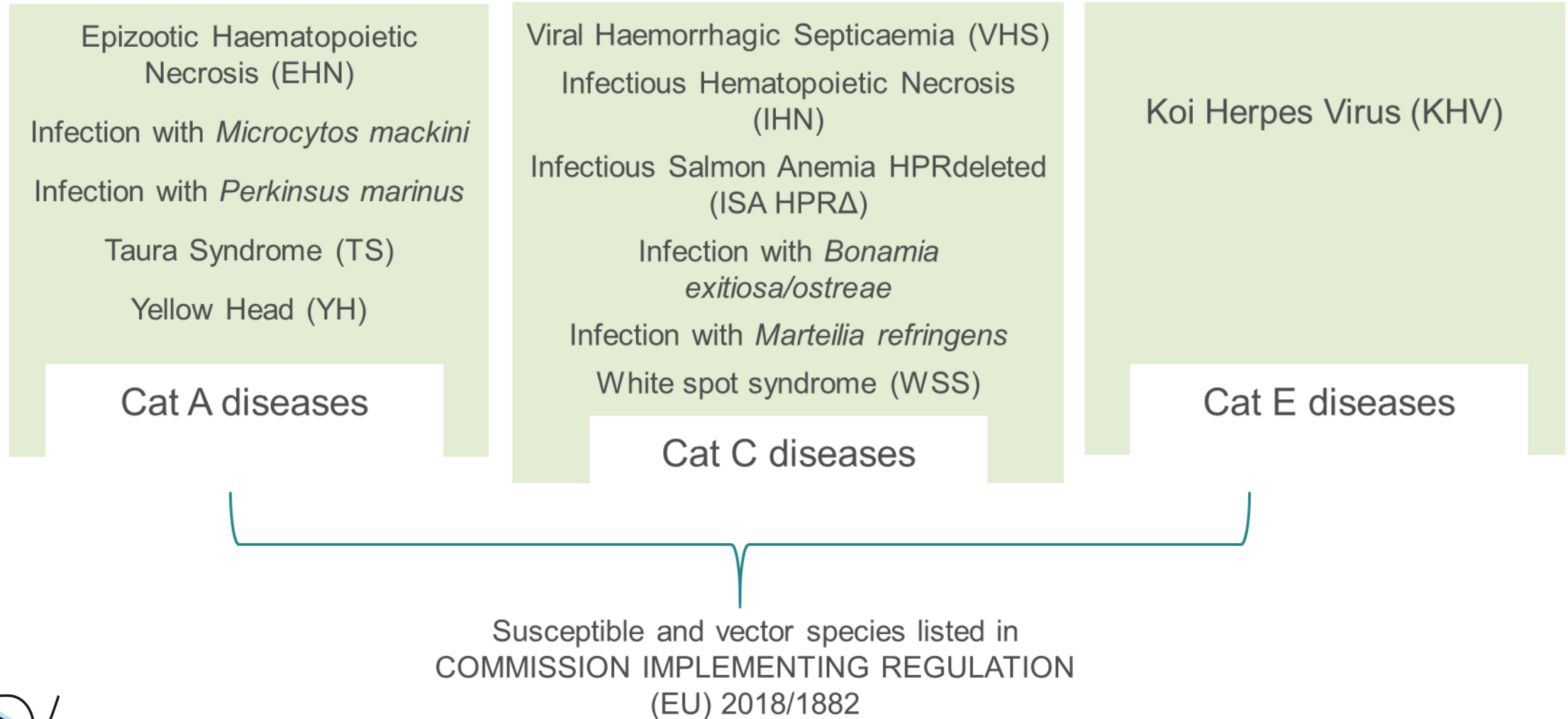
Union surveillance programmes, the geographical scope of such programmes and the listed diseases for which the disease-free status of compartments may be established

RE (EU) 2021/620

national measures designed to limit the impact of certain diseases of aquatic animals

● Comparison with EU regulation

- List of diseases- different priorities related to different diseases



Susceptible vs vector species

- CIR (EU) 2018/1882
- Susceptibles species (column 3)
- Vector species (column 4)
- Vector species are those species that can act as reservoirs for that disease, or scientific evidence indicates that such role is likely
- The Commission shall, by means of implementing acts, remove/add animal species or groups of animal species from the list

Name of listed disease	Category of listed disease	Listed species	
		Species and group of species	Vector species
Viral haemorrhagic septicaemia	C+D+E	<i>Alosa immaculata</i> , <i>Ameiurus nebulosus</i> , <i>Ambloplites rupestris</i> , <i>Ammodytes hexapterus</i> , <i>Aplodinotus grunniens</i> , <i>Centrolabrus exoletus</i> , <i>Clupea harengus</i> , <i>Clupea pallasii</i> , <i>Coregonus artedii</i> , <i>Coregonus clupeaformis</i> , <i>Coregonus lavaretus</i> , <i>Ctenolabrus rupestris</i> , <i>Cyclopterus lumpus</i> , <i>Cymatogaster aggregata</i> , <i>Dorosoma cepedianum</i> , <i>Danio rerio</i> , <i>Engraulis encrasicolus</i> , <i>Esox lucius</i> , <i>Esox masquinongy</i> , <i>Fundulus heteroclitus</i> , <i>Gadus macrocephalus</i> , <i>Gadus morhua</i> , <i>Gaidropsarus vulgaris</i> , <i>Gasterosteus aculeatus</i> , <i>Labrus bergylta</i> , <i>Labrus mixtus</i> , <i>Lampetra fluviatilis</i> , <i>Lepomis gibbosus</i> , <i>Lepomis macrochirus</i> , <i>Limanda limanda</i> , <i>Merlangius merlangus</i> , <i>Micropterus dolomieu</i> , <i>Micropterus salmoides</i> , <i>Micromesistius poutassou</i> , <i>Morone americana</i> , <i>Morone chrysops</i> , <i>Morone saxatilis</i> , <i>Mullus barbatus</i> , <i>Neogobius melanostomus</i> , <i>Notropis atherinoides</i> , <i>Notropis hudsonius</i> , <i>Oncorhynchus kisutch</i> , <i>Oncorhynchus mykiss</i> , <i>Oncorhynchus mykiss X Oncorhynchus kisutch hybrids</i> , <i>Oncorhynchus tshawytscha</i> , <i>Paralichthys olivaceus</i> , <i>Perca flavescens</i> , <i>Pimephales notatus</i> , <i>Pimephales promelas</i> , <i>Platichthys flesus</i> , <i>Pleuronectes platessa</i> , <i>Pomatoschistus minutus</i> , <i>Pomoxis nigromaculatus</i> , <i>Raja clavata</i> , <i>Salmo marmoratus</i> , <i>Salmo salar</i> , <i>Salmo trutta</i> , <i>Salvelinus namaycush</i> , <i>Sander vitreus</i> , <i>Sardina pilchardus</i> , <i>Sardinops sagax</i> , <i>Scomber japonicus</i> , <i>Scophthalmus maximus</i> , <i>Solea senegalensis</i> , <i>Sprattus sprattus</i> , <i>Symphodus melops</i> , <i>Thaleichthys pacificus</i> , <i>Trachurus mediterraneus</i> , <i>Trisopterus esmarkii</i> , <i>Thymallus thymallus</i> , <i>Uranoscopus scaber</i>	<i>Acipenser baerii</i> , <i>Acipenser gueldenstaedtii</i> , <i>Acipenser ruthenus</i> , <i>Acipenser stellatus</i> , <i>Acipenser sturio</i> , <i>Ameiurus melas</i> , <i>Argyrosomus regius</i> , <i>Aristichthys nobilis</i> , <i>Carassius auratus</i> , <i>Carassius carassius</i> , <i>Clarias gariepinus</i> , <i>Cyprinus carpio</i> , <i>Dentex dentex</i> , <i>Dicentrarchus labrax</i> , <i>Diplodus puntazzo</i> , <i>Diplodus sargus</i> , <i>Diplodus vulgaris</i> , <i>Epinephelus aeneus</i> , <i>Epinephelus marginatus</i> , <i>Huso huso</i> , <i>Hypophthalmichthys molitrix</i> , <i>Ictalurus punctatus</i> , <i>Ictalurus spp.</i> , <i>Leuciscus spp.</i> , <i>Morone chrysops x</i> , <i>Morone saxatilis</i> , <i>Mugil cephalus</i> , <i>Oreochromis</i> , <i>Pagellus bogaraveo</i> , <i>Pagellus erythrinus</i> , <i>Pagrus major</i> , <i>Pagrus pagrus</i> , <i>Pangasius pangasius</i> , <i>Rutilus rutilus</i> , <i>Salvelinus alpinus</i> , <i>Salvelinus fontinalis</i> , <i>Sander lucioperca</i> , <i>Scardinius erythrophthalmus</i> , <i>Sciaenops ocellatus</i> , <i>Silurus glanis</i> , <i>Solea senegalensis</i> , <i>Solea solea</i> , <i>Sparus aurata</i> , <i>Thunnus spp.</i> , <i>Thunnus thynnus</i> , <i>Tinca tinca</i> , <i>Umbrina cirrosa</i>

● The hierarchy of diagnostic methods according to AHL

- RD (EU) 2020/689
- Part II, Chapter 1, art. 6
- Collection of samples, techniques, validation and interpretation of diagnostic methods for the purpose of surveillance shall comply with:

RD 2020/689 ANNEX VI, Part II
+
EURL Diagnostic Manual

WOAH Aquatic Manual

Official methods according
to Art 34 of Regulation (EU)
2017/625 (Official controls)

● Difference with EU regulation

- Pathways for claiming disease freedom:
- Historical freedom – difficult to apply for fish diseases
- Incapacity of pathogens to survive
- Independent compartments - facilitate way of obtaining (and regaining) disease-freedom (art. 80.3 RD 2020/689)

**THANK
YOU!**

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