# Appendix C: Evidence for proposed changes to risk lists

**Table C1 Evidence for proposed changes to the high-risk species list (specified species)**

**Host species Pathogen Reference Pathway of Identification Replication Viable Pathology Location Procedure**

**infection and growth pathogen outcome**

Yes – gross pathology showed haemorrhaging of internal organs and extended abdomen

*Acanthopagrus schlegeli*

*Alosa immaculata*

VHSV Isshiki, Nagano

& Miyazaki

(2003)

VHSV Ogut & Altuntas

(2014)

Experimental Invasive IP injection

Natural detection in wild fish

Yes – IFAT test ndi Yes – the virus

was isolated by cell culture

Yes – ELISA test. nd Yes – the virus

was isolation by cell culture displaying a cytopathic effect

Yes – virus 2b

was isolated   
from pooled   
samples

including

target organs   
the kidney,   
spleen and   
heart

|  |
| --- |
| 2a |

No clinical signs of infection Yes – virus was isolated from pooled samples including target organs the kidney and spleen, and one non-target organ (liver).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Anarhichas minor* | IPNV Sommer et al.  (2004) | Experimental natural transmission by bath immersion and co-habitation | Yes – IPNV was identified by neutralisation using IPNV specific polyclonal antibodies | Yes – the viral titre was determined by end-point dilution and the viral titre calculated increased over time for fish that were bath challenged | Yes – virus isolation by cell culture displaying a cytopathic effect | Yes – observed a rapid onset of mortality | Yes – detected in samples of intestine, a target organ for IPNV | 2a |

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**Host species Pathogen Reference Pathway of Identification Replication Viable Pathology Location Procedure**

**infection and growth pathogen outcome**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Belone belone* VHSV Ogut & Altuntas  (2014) | Natural detection in wild fish | Yes – ELISA test nd Yes – virus  isolation by cell culture displaying a cytopathic effect | No clinical signs of infection Yes – virus isolated from pooled samples including target organs kidney and spleen, and one non-target organ (liver) | 2a |

*Centrolabrus exoletus*

*Ctenolabrus rupestris*

*Cyclopterus lumpus*

*Dicentrarchus labrax*

Natural detection in a marine hatchery

Natural detection in a marine hatchery

Natural detection in wild fish, experimental natural by cohabitation and experimental invasive IP injection

nd Yes – virus

isolation by cell culture displaying a cytopathic effect

nd Yes – virus

isolation by cell culture displaying a cytopathic effect

nd Yes – virus

isolation by cell culture

Yes–pathological signs of infection in target organs the kidney heart and spleen. Trematoda and bacteria were found in the intestine and gill respectively.

Yes–pathological signs of infection in target organs the kidney heart and spleen. Trematoda and bacteria were found in the intestine and gill respectively.

Yes – Increased rate of mortality, skin ulcers and pale gills. Bacteria isolated from ulcers.

Yes – virus 2a

isolated from   
target organs   
kidney, heart   
and brain

Yes – virus 2a

isolated from   
target organs   
kidney, heart   
and brain

Yes – virus 2a

isolated from   
pooled

samples of   
target organs   
kidney, heart   
and spleen

Yes – qRT-PCR and ELISA test

Yes – qRT-PCR and ELISA test

Yes – ELISA test and RT-PCR

VHSV Munro et al.

(2015)

VHSV Munro et al.

(2015)

VHSV Guðmundsdóttir

et al. (2019)

VHSV OIE (2019) n/a n/a n/a n/a n/a n/a 1

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**Host species Pathogen Reference Pathway of Identification Replication Viable Pathology Location Procedure**

**infection and growth pathogen outcome**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Engraulis encrasicolus* | VHSV Ogut & Altuntas  (2014) | Natural detection in wild fish | Yes – ELISA test nd Yes – virus  isolation by cell culture displaying a cytopathic effect | No clinical signs of infection Yes – virus isolated from pooled samples including target organs the kidney and spleen, and one non-target organ (liver) | 2a |

*Epinephelus akaara*

*Eutrigla gurnardus*

*Lampetra fluviatilis*

VHSV Isshiki, Nagano

& Miyazaki

(2003)

VHSV Wallace et al.

(2015)

Experimental Invasive IP injection

Natural detection in wild fish

Natural detection in a marine hatchery

Yes – virus isolation by cell culture followed by IFAT test

Yes – ELISA test and partial nucleic acid sequencing

Yes – qRT-PCR and ELISA test

nd Yes – virus

isolation by cell culture

nd Yes – virus

isolation by cell culture displaying a cytopathic effect

nd Yes – virus

isolation by cell culture displaying a cytopathic effect

Yes – haemorrhaging of internal organs and extended abdomen

Yes–pathological signs of infection in target organs the kidney heart and spleen. Trematoda and bacteria were found in the intestine and gill respectively.

Yes – virus 2b

isolated from

pooled   
samples,   
including

target organs

kidney, spleen

and heart

2a

Yes – virus 2a

isolated from   
target organs   
kidney, heart   
and brain

nd Yes – virus isolated from pooled samples of target organs the brain, heart, kidney and spleen

*Labrus bergylta* VHSV Munro et al.

(2015)

VHSV OIE (2019) n/a n/a n/a n/a n/a n/a 1

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**Host species Pathogen Reference Pathway of Identification Replication Viable Pathology Location Procedure**

**infection and growth pathogen outcome**

Yes – ELISA test nd Yes – virus

isolation by cell culture displaying a cytopathic effect

Yes – ELISA test nd Yes – virus

isolation by cell culture displaying a cytopathic effect

Yes – ELISA test nd Yes – virus

isolation by cell culture displaying a cytopathic effect

No clinical signs of infection Yes – virus 2a

isolated from pooled

samples

including

target organs kidney and spleen, and one non-

target organ (liver)

No clinical signs of infection Yes – virus 2a

isolated from pooled

samples

including

target organs the kidney and spleen, and one non-

target organ (liver)

No clinical signs of infection Yes – Virus 2a

isolated from pooled

samples

including

target organs kidney and spleen, and one non-

target organ (liver)

nd Yes – Isolation 2a

from samples containing kidney and spleen tissue

*Mullus* VHSV Ogut & Altuntas Natural;detection

*barbatus* (2014) in wild fish

*Sardina* VHSV Ogut & Altuntas Natural detection

*pilchardus* (2014) in wild fish

*Scorpaena* VHSV Ogut & Altuntas Natural detection

*porcus* (2014) in wild fish

Natural Yes nd Yes – isolation

by cell culture using extended incubation

Sparus aurata VHSV European Food

Safety Authority (2008)

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**Host species Pathogen Reference Pathway of Identification Replication Viable Pathology Location Procedure**

**infection and growth pathogen outcome**

|  |  |  |  |
| --- | --- | --- | --- |
| *Solea spp.* VHSV European Food  Safety Authority (2008) | Natural Yes nd Yes – Isolation  by cell culture using extended incubation | nd Yes – isolation  from samples containing kidney and spleen tissue | 2a |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Symphodus melops* | VHSV Munro et al.  (2015) | Natural Yes – qRT-PCR  and ELISA test | nd Yes – virus isolation by cell culture displaying a cytopathic effect | Yes–pathological signs of infection in target organs the kidney heart and spleen. Trematoda and bacteria were found in the intestine and gill respectively. | Yes – virus isolated from target organs the kidney, heart and brain | 2a |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Trachurus mediterraneus* | VHSV Ogut & Altuntas  (2014) | Natural detection in wild fish | Yes – ELISA test nd Yes – virus  isolation by cell culture displaying a cytopathic effect | Skin lesions presumptively caused by bacteria, Aeromonas spp. | Yes – virus isolated from pooled samples including target organs the kidney and spleen, and one non-target organ (liver) | 2a |

**VHSV** Viral haemorrhagic septicaemia virus. **IPNV** Infectious pancreatic necrosis virus. **n/a** Not applicable as recognised as susceptible by the OIE. **nd** Not done in the scientific paper. **IP Injection** Intraperitoneal injection. **ELISA** Enzyme-linked Immunosorbent Assay. **IFAT** Indirect Fluorescent Antibody Test. **PCR** Polymerase Chain Reaction. **RT-PCR** Real-Time PCR. **qRT-PCR** Real-Time Quantitative Reverse Transcription PCR. **Outcome of procedure** The combination of evidence of susceptibility (1,2a or 2b) that the evidence fulfills as outlined in the 'Procedure to determine finfish susceptibility to infection with a specific pathogenic agent'.

Note: A pathway of infection, identification, replication and growth, viable pathogen, pathology and location are the 6 OIE criteria for listing species as susceptible to infection with a specific pathogen.

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**Table C2 Evidence for proposed changes to the medium-risk species list (approved specified species)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Host species** | **Pathogen** | **Reference** | **Pathway of infection** | **Identification** | **Replication and growth** | **Viable pathogen** |
| *Girella punctate* | Causative agent of RSIVD | OIE (2019) | n/a | n/a | n/a | n/a |
| *Larimichthys crocea* | Causative agent of RSIVD | OIE (2019) | n/a | n/a | n/a | n/a |
| *Lates calcarifer* | Causative agent of RSIVD | OIE (2019) | n/a | n/a | n/a | n/a |
| *Oxyeleotris* | Causative | Ming – Hui et | Natural | Yes – PCR and | nd | nd |
| *marmoratus* | agent of RSIVD | al. (2013) |  | sequencing |  |  |

**Pathology Location Outcome of**

**procedure**

n/a n/a 1

n/a n/a 1

n/a n/a 1

Yes – atypical swimming, Yes – gill tissue 2a

rapid onset of mortality, tested positive   
histopathological signs of for the virus by

infection in the spleen, PCR   
kidney, and gills

OIE (2019) n/a n/a n/a n/a n/a n/a 1

OIE (2019) n/a n/a n/a n/a n/a n/a 1

OIE (2019) n/a n/a n/a n/a n/a n/a 1

OIE (2019) n/a n/a n/a n/a n/a n/a 1

*Plectorhinchus cinctus*

*Rachycentron canadum*

*Scomberomorus niphonius*

*Trachinotus blochii*

Causative agent of RSIVD

Causative agent of RSIVD

Causative agent of RSIVD

Causative agent of RSIVD

**RSIVD** Red sea bream iridoviral disease. **n/a** Not applicable as recognised as susceptible by the OIE. **nd** Not done in the scientific paper. **PCR** Polymerase Chain Reaction. **Outcome of procedure** The combination of evidence of susceptibility (1,2a or 2b) that the evidence fulfills as outlined in the 'Procedure to determine finfish susceptibility to infection with a specific pathogenic agent'.

Note: A pathway of infection, identification, replication and growth, viable pathogen, pathology and location are the 6 OIE criteria for listing species as susceptible to infection with a specific pathogen. A causative agent of RSIVD is defined here as red sea bream iridovirus (RSIV) or infectious spleen and kidney necrosis virus (ISKNV) (OIE 2019). *Larimichthys crocea* is listed as *Pseudosciaena crocea* by the OIE.

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**Table C3 Evidence for proposed changes to the 'Specified bony fish species other than from the family Salmonidae and genus Plecoglossus' list or 'baitfish list'**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Source  country** | **Host species** | **Pathogen** | **Reference** | **Pathway of infection** | **Identification** | **Replication and growth** | **Viable pathogen** |
| When sourced from all countries | *Alosa  immaculata* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
| other than New Zealand | *Anarhichas  minor* | IPNV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Belone belone* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Centrolabrus exoletus* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Ctenolabrus rupestris* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Cyclopterus lumpus* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Engraulis encrasicolus* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Epinephelus akaara* | VHSV | See table C1 | See table C1 | See table C1 | See table C1 | See table C1 |
|  | *Lates calcarifer* | *Photobacterium* | Pham et al. | Experimental | Yes – the | nd | Yes – Isolation |
|  |  | *damselae* subsp. *piscicida* | (2020) | invasive IP  injection | pathogen was identified by using gram-stained smears and a PCR test |  | by cell culture |

**Pathology Location Outcome of**

**procedure**

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

See table C1 See table C1 See table C1

Yes – stopped Yes – the 2b

eating, pathogen was

abnormal isolated from

swimming, the liver and

haemorrhaging spleen

of the liver and

spleen,

enlarged

spleen and

white

granulomas on

internal organs

*Mullus barbatus* VHSV See table C1 See table C1 See table C1 See table C1 See table C1 See table C1 See table C1 See table C1

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**Source Host species Pathogen Reference Pathway of Identification Replication Viable Pathology Location Outcome of**

**country infection and growth pathogen procedure**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Pagellus erythrinus* | *Photobacterium damselae* subsp. *piscicida* | Yiagnisis &  Athanasopo  ulou (2011) | Natural Yes – agglutination test and biochemical characterisatio n | nd Yes – isolation  by cell culture | Yes – no clinical signs specifically associated with the pathogen but fish appeared to be infected with a bacterial pathogen, or were freshly dead | Yes – the pathogen was isolated from the head and kidney tissue. Spleen liver and brain tissue also tested positive for the pathogen | 2a |

Yes – gram stained smears with follow-up PCR test

|  |  |  |  |
| --- | --- | --- | --- |
| *Sardina pilchardus* | VHSV | See table C1 | See table C1 |
| *Scorpaena porcus* | VHSV | See table C1 | See table C1 |
| *Symphodus melops* | VHSV | See table C1 | See table C1 |
| *Trachurus mediterraneus* | VHSV | See table C1 | See table C1 |
| *Thunnus* spp. | *Photobacterium damselae* subsp. *piscicida* | Mladineo, Miletić & Bočina | Natural |

(2006)

nd Yes–Isolation Yes – stopped

by cell culture eating, abnormal swimming, haemorrhaging of the liver and spleen, enlarged spleen and white granulomas in internal organs

nd Yes – Isolation Yes – changed

by cell culture coloration, septicimia and atypical swimming observed

Yes – pathogen 2b

was isolated

from the liver

and spleen

*Rachycentron* Photobacterium Pham et al. Experimental

*canadum* damselae subsp. (2020) invasive IP

piscicida injection

See table C1 See table C1 See table C1 See table C1 See table C1 See table C1

See table C1 See table C1 See table C1 See table C1 See table C1 See table C1

See table C1 See table C1 See table C1 See table C1 See table C1 See table C1

See table C1 See table C1 See table C1 See table C1 See table C1 See table C1

Yes – swabs of 2a

the liver,

spleen kidney

and brain

tissue tested

positive

Yes – agglutination test and biochemical characterisatio n

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|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Source  country** | **Host species** | **Pathogen** | **Reference** | **Pathway of infection** | **Identification** | **Replication  and growth** | **Viable pathogen** | **Pathology** | **Location** | **Outcome of  procedure** |
| When sourced from all countries in, and islands surrounding | *Girella punctate*  *Larimichthys crocea* | A causative agent of RSIVD  A causative agent of RSIVD | See table C2  See table C2 | See table C2  See table C2 | See table C2  See table C2 | See table C2  See table C2 | See table C2  See table C2 | See table C2  See table C2 | See table C2  See table C2 | See table C2  See table C2 |
| Asia | *Lethrinus haematopterus* | A causative agent of RSIVD | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 |
|  | *Oxyeleotris  marmoratus* | A causative agent of RSIVD | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 |
|  | *Parapristipoma* spp. | A causative agent of RSIVD | Kahn et al.  (1999) | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
|  | *Plectorhinchus cinctus* | A causative agent of RSIVD | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 |
|  | *Stephanolepis* spp. | A causative agent of RSIVD | Kahn et al.  (1999) | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
|  | *Scomberomorus niphonius* | A causative agent of RSIVD | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 | See table C2 |

**VHSV** Viral haemorrhagic septicaemia virus. **IPNV** Infectious pancreatic necrosis virus. **n/a** Not applicable as listed as susceptible in the 1999 Import risk analysis on non-viable salmonids and non-salmonid marine finfish **IP injection** Intraperitoneal injection. **RSIVD** Red sea bream iridoviral disease. **PCR** Polymerase Chain Reaction**. Outcome of procedure** is the combination of evidence of susceptibility (1,2a or 2b) that the evidence fulfills as outlined in the 'Procedure to determine finfish susceptibility to infection with a specific pathogenic agent'.

Note: A pathway of infection, identification, replication and growth, viable pathogen, pathology and location are the 6 OIE criteria for listing species as susceptible to infection with a specific pathogen. A causative agent of RSIVD is defined here as either red sea bream iridovirus (RSIV) or infectious spleen and kidney necrosis virus (ISKNV) (OIE 2019).

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**Table C4 The evidence for the changes that have already been made**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Host species** | **Pathogen** | **Reference** | **Pathway of infection** | **Identification** | **Replication and growth** | **Viable pathogen** | **Pathology** | **Location** | **Outcome of  procedure** |
| *Lethrinus haematopterus* | Causative agent of RSIVD | OIE (2019) | n/a | n/a | n/a | n/a | n/a | n/a | 1 |
| *Lates calcarifer* | Causative agent of RSIVD | OIE (2019) | n/a | n/a | n/a | n/a | n/a | n/a | 1 |
| *Scomber japonicas* | A causative agent of RSIVD | OIE (2019) | n/a | n/a | n/a | n/a | n/a | n/a | 1 |

**RSIVD** Red sea bream iridoviral disease. **n/a** Not applicable as recognised as susceptible by the World Organisation for Animal Health (OIE). **Outcome of procedure** The combination of

evidence of susceptibility (1, 2a or 2b) that the evidence fulfills as outlined in the 'Procedure to determine finfish susceptibility to infection with a specific pathogenic agent'.

Note: A causative agent of RSIVD is defined here as either red sea bream iridovirus (RSIV) or infectious spleen and kidney necrosis virus (ISKNV) (OIE 2019).

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