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 infection	Identification	Replication and growth	Viable pathogen	Pathology	Location	Procedure outcome
Acanthopagrus schlegeli	VHSV	Isshiki, Nagano & Miyazaki (2003)	Experimental Invasive IP injection	Yes – IFAT test	ndi	Yes – the virus was isolated by cell culture	Yes – gross pathology showed haemorrhaging of internal organs and extended abdomen	Yes – virus was isolated from pooled samples including target organs the kidney, spleen and heart	2b
Alosa immaculata	VHSV	Ogut & Altuntas (2014)	Natural detection in wild fish	Yes – ELISA test.	nd	Yes – the virus was isolation by cell culture displaying a cytopathic effect	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).	2a
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

Host species	Pathogen	Reference	Pathway of infection	Identification	Replication and growth	Viable pathogen	Pathology	Location	Procedure 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	VHSV	Munro et al. (2015)	Natural detection in a marine hatchery	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 kidney, heart and brain	2a
Ctenolabrus rupestris	VHSV	Munro et al. (2015)	Natural detection in a marine hatchery	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 kidney, heart and brain	2a
Cyclopterus lumpus	VHSV	Guðmundsdóttir et al. (2019)	Natural detection in wild fish, experimental natural by cohabitation and experimental invasive IP injection	Yes – ELISA test and RT-PCR	nd	Yes – virus isolation by cell culture	Yes – Increased rate of mortality, skin ulcers and pale gills. Bacteria isolated from ulcers.	Yes – virus isolated from pooled samples of target organs kidney, heart and spleen	2a
Dicentrarchus labrax	VHSV	OIE (2019)	n/a	n/a	n/a	n/a	n/a	n/a	1

Host species	Pathogen	Reference	Pathway of infection	Identification	Replication and growth	Viable pathogen	Pathology	Location	Procedure 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	VHSV	Isshiki, Nagano & Miyazaki (2003)	Experimental Invasive IP injection	Yes – virus isolation by cell culture followed by IFAT test	nd	Yes – virus isolation by cell culture	Yes – haemorrhaging of internal organs and extended abdomen	Yes – virus isolated from pooled samples, including target organs kidney, spleen and heart	2b
Eutrigla gurnardus	VHSV	Wallace et al. (2015)	Natural detection in wild fish	Yes – ELISA test and partial nucleic acid sequencing	nd	Yes – virus isolation by cell culture displaying a cytopathic effect	nd	Yes – virus isolated from pooled samples of target organs the brain, heart, kidney and spleen	2a
Labrus bergylta	VHSV	Munro et al. (2015)	Natural detection in a marine hatchery	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 kidney, heart and brain	2a
Lampetra fluviatilis	VHSV	OIE (2019)	n/a	n/a	n/a	n/a	n/a	n/a	1

Host species	Pathogen	Reference	Pathway of infection	Identification	Replication and growth	Viable pathogen	Pathology	Location	Procedure outcome
Mullus barbatus	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
Sardina pilchardus	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
Scorpaena porcus	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
Sparus aurata	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

Host species	Pathogen	Reference	Pathway of infection	Identification	Replication and growth	Viable pathogen	Pathology	Location	Procedure 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.

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	Pathology	Location	Outcome of procedure
Girella punctate	Causative agent of RSIVD	OIE (2019)	n/a	n/a	n/a	n/a	n/a	n/a	1
Larimichthys crocea	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
Oxyeleotris marmoratus	Causative agent of RSIVD	Ming – Hui et al. (2013)	Natural	Yes – PCR and sequencing	nd	nd	Yes – atypical swimming, rapid onset of mortality, histopathological signs of infection in the spleen, kidney, and gills	Yes – gill tissue tested positive for the virus by PCR	2a
Plectorhinchus cinctus	Causative agent of RSIVD	OIE (2019)	n/a	n/a	n/a	n/a	n/a	n/a	1
Rachycentron canadum	Causative agent of RSIVD	OIE (2019)	n/a	n/a	n/a	n/a	n/a	n/a	1
Scomberomorus niphonius	Causative agent of RSIVD	OIE (2019)	n/a	n/a	n/a	n/a	n/a	n/a	1
Trachinotus blochii	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 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.

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	Pathology	Location	Outcome of procedure
When sourced from all countries other than New Zealand	*Alosa immaculata*	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
	Anarhichas minor	IPNV	See table C1	See table C1	See table C1	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	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	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	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	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	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	See table C1	See table C1	See table C1
	Lates calcarifer	*Photobacterium damselae* subsp. *piscicida*	Pham et al. (2020)	Experimental invasive IP injection	Yes – the pathogen was identified by using gram-stained smears and a PCR test	nd	Yes – Isolation by cell culture	Yes – stopped eating, abnormal swimming, haemorrhaging of the liver and spleen, enlarged spleen and white granulomas on internal organs	Yes – the pathogen was isolated from the liver and spleen	2b
	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

Source country	Host species	Pathogen	Reference	Pathway of infection	Identification	Replication and growth	Viable pathogen	Pathology	Location	Outcome of procedure
	Pagellus erythrinus	*Photobacterium damselae* subsp. *piscicida*	Yiagnisis & Athanasopoulou (2011)	Natural	Yes – agglutination test and biochemical characterisation	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
	Rachycentron canadum	Photobacterium damselae subsp. piscicida	Pham et al. (2020)	Experimental invasive IP injection	Yes – gram stained smears with follow-up PCR test	nd	Yes–Isolation by cell culture	Yes – stopped eating, abnormal swimming, haemorrhaging of the liver and spleen, enlarged spleen and white granulomas in internal organs	Yes – pathogen was isolated from the liver and spleen	2b
	Sardina pilchardus	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
	Scorpaena porcus	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
	Symphodus melops	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
	Trachurus mediterraneus	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
	Thunnus spp.	*Photobacterium damselae* subsp. *piscicida*	Mladineo, Miletić & Bočina (2006)	Natural	Yes – agglutination test and biochemical characterisation	nd	Yes – Isolation by cell culture	Yes – changed coloration, septicimia and atypical swimming observed	Yes – swabs of the liver, spleen kidney and brain tissue tested positive	2a

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 Asia	*Girella punctate*	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
	Larimichthys crocea	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
	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).

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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