FishVet Group

Risk analysis for the movement and use of wild caught wrasse (*Labridae*) in Ireland

Scope of risk analysis: the primary purpose of this assessment is to provide a guidance for stakeholders on potential risks associated with the use of wild caught wrasse in Ireland and to advise on best practice to mitigate those risks. This guidance goes beyond, and is not intended to replace, the legal requirements prescribed in EU 2006/88. Operators should primarily consult with the responsible veterinarian over their specific requirements if there is deviation from the best practice.

This analysis includes an identification of potential hazards based on current knowledge, a risk assessment posed by potential hazards identified, risk management recommendations and a summary and conclusions section.

1. Identification of Hazards: identification of pathogens that: (a) are notifiable and/or (b) could cause disease in wrasse* or farmed Atlantic salmon (*Salmon salar)* in co-habitation with wrasse.

*Unless otherwise specified, "wrasse" will refer to the following species: Ballan wrasse (*Labrus bergylta*), Corkwing wrasse (*Symphodus melops*), Rock cook wrasse (*Centrolabrus exoletus*), Goldsinny wrasse (*Ctenolabrus rupestris*) and Cuckoo wrasse (*Labrus mixtus*).

Potential hazards:

1.1. Viruses:
- 1.1.1. Viral haemorrhagic septicaemia virus (VHSV)
- 1.1.2. Epizootic haematopoetic necrosis virus (EHNV)
- 1.1.3. Infectious salmon anaemia virus HPR deleted (ISAV-HPR deleted)
- 1.1.4. Infectious haematopoetic necrosis virus (IHNV)
- 1.1.5. Salmonid alphavirus (SAV)
- 1.1.6. Infectious pancreatic necrosis virus (IPN)
- 1.1.7. Piscine reovirus (PRV)
- 1.1.8. Piscine myocarditis virus (PMCV)
- 1.1.9. Betanodavirus
- 1.1.10. Lymphocystis virus
- 1.1.11. Novel viral infections of wrasse

1.2. Bacteria:
- 1.2.1. *Renibacterium salmoninarum*
- 1.2.2. *Aeromonas salmonicida* (atypical subspecies)
- 1.2.3. *Aeromonas salmonicida* (subspecies *salmonicida)*
- 1.2.4. *Vibrio anguillarum*
- 1.2.5. *Vibrio splendidus*
- 1.2.6. *Vibrio tapetis*
- 1.2.7. *Vibrio salmonicida*
- 1.2.8. *Moritella viscosa*
- 1.2.9. *Mycobacterium* spp.
- 1.2.10. *Pseudomonas anguilliseptica*
- 1.2.11. *Yersinia ruckeri*
- 1.2.12. *Piscirickettsia salmonis*
- 1.2.13. Novel bacterial infections of wrasse

1.3. Parasites

1.3.1. *Gyrodactylus salaris*

1.3.2. *Neoparamoeba perurans*

1.3.3. Novel parasitic infections of wrasse

1.4. Fungi:

1.4.1. Novel fungal infections of wrasse

2. Risk assessment: the risk assessment for each hazard is made using the 5 components outline below:

2.1 Release assessment I: an estimation of the probability (i.e. likelihood) of fish movement resulting in hazard introduction. Biological risk factors, source risk factors and item risk factors are considered. Table 1 contains a definition of terms. **If the risk is considered negligible the assessment is ended at this point.**

Table 1: terms used to quantify risk in sections 2.1, 2.2 and 2.3.

Scale for release assessment, exposure assessment and the probability of establishment	
High (H)	Event would be expected to occur
Moderate (M)	There is a less than even chance of the event occurring
Low (L)	Event would occur occasionally
Very low (VL)	Event would occur very rarely
Negligible (N)	Chance of event occurring is so small it can be ignored

2.2. Exposure assessment I: the probability of a pathogen release resulting in infection of Atlantic salmon or wrasse. Biological risk factors, destination risk factors and item risk factors are considered. If there are differences in risk for salmon and wrasse the higher risk category is used. **If the risk is considered negligible the assessment is ended at this point.**

2.3. Probability of establishment (PE): the risk of a pathogen being introduced, calculated through a conversion chart using the release assessment and the exposure assessment (figure 1).

		Exposure assessment (E) →				
		Negligible (N)	Very Low (VL)	Low (L)	Moderate (M)	High (H)
Release assessment (R) ↑	High (H)	N	VL	L	M	H
	Moderate (M)	N	VL	L	M	M
	Low (L)	N	N	VL	L	L
	Very Low (VL)	N	N	N	VL	VL
	Negligible (N)	N	N	N	N	N

Figure 1: Conversion chart used to calculate the probability of establishment of a pathogen / hazard.

2.4. Consequence assessment I: an evaluation of the consequences of introduction considering potential hazards to human health, fish health and the environment. Table 2 contains a definition of terms.

Table 2: Terms used to describe the significance of consequences.

Scale for significance of consequences	
High	Associated with diseases that would have serious biological effects (e.g. high mortality or morbidity). Such effects would be expected to be felt for a prolonged period and would not be amenable to control measures. Such diseases would be expected to result in significant economic losses at an industry level, or they may cause serious harm to the environment.
Moderate	Associated with diseases that have less pronounced biological effects. Such effects may harm economic performance at an enterprise/regional level. These diseases may be amenable to control measures at a significant cost, or their effects may be temporary. They may affect the environment, but such harm would not be irreversible.
Low	Associated with diseases that have mild biological effects and would normally be amenable to control measures. Such diseases would be expected to harm economic performance at an enterprise/regional level. Effects on the environment would be minor or temporary.
Negligible	Associated with diseases that have no significant or only transient biological effects. Such diseases may be readily amenable to control measures. The economic effects would be low at an enterprise level and insignificant at a regional level. Effects on the environment would be insignificant.

2.5. Risk estimation (Risk): an estimation of the overall risk posed by a hazard, calculated from the probability of establishment and the consequence assessment through a conversion table (figure 2). If the result is "Yes", the risk is considered acceptable, "No" means the risk is not acceptable **in the absence of risk management measures** and "Yes/No" means the risk is uncertain.
The risk determined is the **unrestricted estimate of risk, i.e. the risk based on the absence of risk management)**. Each hazard is considered separately in the risk evaluation below (table 3).

		Significance of Consequences →			
		Negligible (N)	Low (L)	Moderate (M)	High (H)
Probability of Establishment ↑	High (H)	Yes	No	No	No
	Moderate (M)	Yes	No	No	No
	Low (L)	Yes	Yes	No	No
	Very Low (VL)	Yes	Yes	Yes/No	No
	Negligible (N)	Yes	Yes	Yes	Yes

Figure 2: Risk estimation matrix.

Table 3: Risk evaluation for the specific hazards identified in section 1 expressed as N (negligible), VL (very low), L (low), M (moderate), H (high) or U (unknown).

Hazard	R	E	PE	C	Risk	Notes
Viruses						
1.1.1 VHSV	VL	H	VL	H	Not acceptable	• Notifiable • Present in wild fish populations in the northern European marine environment (genotype 3). Detected in WR in the UK associated with clinical disease. Very rarely isolated from AS (susceptibility unclear), can affect RBT
1.1.2 EHNV	N	-	-	-	Acceptable	• Notifiable • Not present in Europe • Not detected in WR to date. Can affect redfin perch and RBT (freshwater), low host specificity. AS only infected experimentally
1.1.3 ISAV– HPR deleted	N	-	-	-	Acceptable	• Notifiable • Not present in Ireland • AS susceptible. No natural infection detected in WR to date. GS could not be experimentally infected and their role as potential vectors was considered highly unlikely. Positive samples in WR cohabited with infected AS in Norway are not verified
1.1.4 IHNV	N	-	-	-	Acceptable	• Notifiable • Not present in Ireland • Not detected in WR to date, AS are susceptible
1.1.5 SAV	VL	H	VL	M	Uncertain	• Present in Ireland (AS and wild fish) • Subtype 6 has been detected in wild WR in Ireland. Has been isolated from WR cohabited with infected AS, significance unknown. Studies indicate a low risk to WR. AS are susceptible
1.1.6 IPNV	VL	H	VL	M	Uncertain	• Present in Ireland (AS) • Experiments concluded that GS are susceptible and can shed the virus but that overall risk was low. AS are susceptible
1.1.7 PRV	L	H	L	L	Acceptable	• Present in Ireland (AS and possibly wild fish) • Has been detected in WR gill samples, significance unknown. AS are susceptible but the infection often remains subclinical
1.1.8. PMCV	VL	H	VL	M	Uncertain	• Present in Ireland (AS) • Has been detected in WR stocked with infected AS, clinical significance unknown. AS are susceptible
1.1.9. Betanodavirus	L	M	L	L	Acceptable	• Present in European marine waters, not detected in Ireland to date. • Detected with 6.7% prevalence in wild wrasse in Sweden and Norway, clinical significance unknown. High numbers of marine fish susceptible, AS not susceptible
1.1.10 Lymphocystis virus	VL	M	VL	L	Acceptable	• Present in Ireland • Cases documented in WR, typically superficial infections with low clinical impact
1.1.11 Novel viruses	U	U	U	U	Uncertain	• Unknown

Hazard	R	E	PE	C	Risk	Notes
Bacteria						
1.2.1 *R. salmoninarum*	VL	L	N	H	Acceptable	• Notifiable • Present in the UK and Norway (AS and RBT) • Not detected in WR to date, AS are susceptible
1.2.2 *A. salmonicida* (atypical)	H	H	H	M	Not acceptable	• Present in Ireland, including wild WR populations • WR, AS and LF susceptible. Research indicates that AS are not susceptible to the same subtype as WR and LF
1.2.3 *A. salmonicida* (typical)	VL	H	VL	M	Uncertain	• Present in Ireland • WR, LF and AS are susceptible
1.2.4. *V. anguillarum*	VL	H	VL	M	Uncertain	• Present in Ireland • AS, LF and WR are susceptible, in part to the same serotypes
1.2.5 *V. splendidus*	H	L	L	L	Acceptable	• Ubiquitous in marine environment • Opportunistic pathogen of WR (CW), considered opportunistic in AS and LF
1.2.6 *V. tapetis*	M	L	L	L	Acceptable	• Ubiquitous in marine environment • Opportunistic pathogen of WR (CW), AS not considered susceptible
1.2.7 *V. salmonicida*	VL	M	VL	M	Uncertain	• Present in Ireland • Not detected in WR to date, AS and LF susceptible
1.2.8 *M. viscosa*	VL	M	VL	M	Uncertain	• Present in Ireland • Has been detected in WR in single cases, significance unknown. AS and LF susceptible, indications of differing strains, significance uncertain
1.2.9 *Mycobacterium* spp	VL	M	VL	L	Acceptable	• Present in Ireland (ornamental and wild fish) • Not detected in WR to date, can affect AS
1.2.10 *Pseudomonas anguilliseptica*	VL	L	N	L	Acceptable	• Present in Ireland • LF susceptible, one case report in AS. Cases of infection reported in WR in Norway but no reports of pathogenicity
1.2.11 *Yesinia ruckerii*	VL	L	N	M	Acceptable	• Present in Ireland • One detection recorded in Norway, significance unknown. AS are susceptible
1.2.12 *Piscirickettsia salmonis*	VL	L	N	M	Acceptable	• Present in Ireland • AS and LF are susceptible. Not documented in WR despite cohabitation with positive AS
1.2.13 Novel bacteria	U	U	U	U	Uncertain	• Unknown
Hazard	**R**	**E**	**PE**	**C**	**Risk**	**Notes**
Parasites						
1.3.1. *G. salaris*	N	-	-	-	Acceptable	• Notifiable, not present in Ireland • AS susceptible in freshwater, no threat in marine environment

1.3.2. *N. perurans*	M	H	M	M	Not acceptable	• Present in Ireland • AS, WR and LF susceptible, interspecies transmission demonstrated between LF and AS
1.3.3. Novel parasites	U	U	U	U	Uncertain	• Unknown

Hazard	R	E	PE	C	Risk	Notes
Fungi						
1.5.1. Novel fungi	U	U	U	U	uncertain	• Unknown

Key: WR: wrasse; AS: Atlantic salmon, RBT: Rainbow trout, LF: lumpfish, B: Ballan wrasse, CW: Corkwing wrasse, GS: Goldsinny wrasse

The risks posed by the following pathogens, are rated "not acceptable" or "uncertain" **in the absence of risk management measures:**

VHSV, SAV, IPNV, PMCV, novel viruses, *A. salmonicida* (atypical), *A. salmonicida* (typical), *V. anguillarum*, *V. salmonicida*, *M. viscosa*, novel bacteria, *Neoparamoeba perurans*, novel parasites and novel fungi.

Some of the pathogens listed above are widespread in the marine environment and in Irish salmon aquaculture (SAV, PMCV, *M. viscosa, Aeromonas salmonicida,* Atypical *Aeromonas salmonicida spp., N. perurans).* The risk posed by introduction of wild wrasse is not always a significant overall increase in risk, depending on health and vaccination status of salmon, level of prevalence and severity of infections detected. To account for the varying significance of pathogen introduction, **consequences of non-notifiable pathogen identification should always be subject to a case specific veterinary evaluation.** This should consider the nature of the pathogen, severity of infection detected in wrasse and the health status/vaccination status of salmon on site. Risk management measures should be determined and implemented following evaluation of all factors (see section 3.7).

3. Risk management:

Implementation of measures to reduce the risks posed by specific hazards to an acceptable level.

3.1. Surveillance of wild wrasse populations

A yearly disease screening of all populations (to be defined by geoographic area) should be conducted to test for the presence of pathogens of concern. 60 fish should be tested as follows:

- Bacteriology: inoculation of kidney material from loop/swab into bacteria culture media: i.e tryptone soya agar (TSA), tryptone soya agar plus salt (TSASA), Columbia blood agar (BCA) and thiosulfate citrate bile salts sucrose agar (TCBS) (individual fish).
- Virology: inoculation of kidney, spleen and heart material into tissue culture cell lines: i.e. BF-2 (bluegill fry) and EPC (epithelial papilloma of carp) (maximum of 5 fish per pool).

- Histology: any fish showing signs of disease and a minimum of 6 fish should be sampled for histology.

If fish in poor body condition, showing indications of disease or abnormal behaviour are present these should be included in the sampling. No fish should be stocked on to salmon farms before results are evaluated.

3.2. Storage of wrasse and veterinary health inspection prior to movement:

- The fish should not be held in close confinement for longer than necessary and wrasse welfare should be optimized in any way possible (see 3.4).
- A veterinary examination of fish from each defined area on a monthly basis is advised prior to stocking into salmon pens. Examination should include:
  - Anaesthesia and clinical examination of a minimum of 30 fish.
  - Full diagnostic evaluation of any fish showing signs of disease and identification of pathogens.

3.3. Movement of wrasse between geographic areas:

- If possible, wrasse should be sourced from the same geographic area (i.e. NW, W and SW) as the site they are to be stocked on.
- If wrasse from a geographic area are to be moved to another, this should be subject to a case specific veterinary assessment.

3.4. Biosecurity and continuous health monitoring of wrasse in sea cages

- Disease outbreaks in wrasse stocks can be stress associated and the welfare of wrasse should be maintained at the highest level possible and in accordance with available guidelines and reference material.
- Wrasse mortalities should be monitored continuously, as with salmon, and categorised by clinical signs (e.g. emaciation, lesions, gill disease, predation, other). Infectious agents should be identified as early as possible to maximise chances of successful treatment and recognition of diseases of concern.
- Staff on sites stocking wrasse should receive training and reference material on wrasse husbandry and recognition of diseases.
- Wrasse should be screened for *Neoparamoeba perurans* regularly and a treatment protocol (using hydrogen peroxide or brackish water following veterinary advice) should be in place if AGD is confirmed.
- Records detailing mortality figures and categorization of mortalities should be kept and should be available for fast access.
- A representative sample of wrasse should be examined regularly by staff on site for indications of impaired welfare and disease.
- Elevated wrasse mortality should be reported to the named veterinarian.
- A veterinary investigation should be initiated if elevated wrasse mortality occurs or if indications of infectious disease are seen.
- Veterinary inspections should be carried out on wrasse in sea pens at least once every 2 months (routine visits) and when morbidity or mortalities are observed (diagnostic visits). As a minimum requirement,

it is suggested that the health status of wrasse stocks on site should be assessed as in section 3.1 once a year for every site.

3.5. Movement of wrasse between sites or re-use of wrasse

- The movement of wrasse between sea sites is a significant biosecurity risk and should always be subject to a case specific risk assessment including a review of the disease history of the site and the production cycle.
- If movement is to take place or wrasse are to be reused after one production cycle, a screening as outlined in 3.1. should be performed in addition to the risk evaluation.

3.6. Vaccination

- Vaccinating salmon is advised if commercial vaccines are available for diseases that have proven problematic in the area.
- Vaccinating wrasse for diseases of particular concern is advised, if suitable vaccines are available. This should be based on a case specific veterinary evaluation.

3.7. Consequences of hazard detection

- If hazards are detected, the movement of fish is to be suspended pending a case specific veterinary evaluation and risk management proposal.
- Risk management measures should be implemented if:
    a) movement of wrasse results in a significant risk increase for salmon, or
    b) stress associated with movement and stocking, in combination with pathogen detected, presents a significant disease or welfare concern for the wrasse.
- Appropriate measures can include treatment, postponing movement, advising against movement or culling.

3.8. Updating of risk analysis

- This risk analysis, while qualitative, has been undertaken with reference to the available scientific literature and data from industry partners from Ireland, the UK, Norway and Iceland and is based on the current state of our knowledge. The risk analysis should be updated on a yearly basis to incorporate new research and descriptions of new pathogens.

4. Summary and conclusions: The main pathogens that have presented disease problems for wrasse, based on published information and industry reports to date, are as follows:

Viruses: VHSV

VHSV has been detected in at least 80 marine and freshwater species and can be divided into 4 genotypes. Different types are endemic to northern hemisphere marine waters, correlating to geographic area rather than to fish species. Genotype III (European marine strain) has been isolated

from all wrasse species commonly used as cleaner fish in Shetland, the infection is thought to have come from wild fish in the area. The risk posed through introduction is significant as VHSV is notifiable, the risk is considered acceptable if fish are screened as outlined.

The clinical significance of PMCV and SAV in wrasse remains uncertain but since these viruses have been detected in wrasse, they need to be considered potential carriers. Any wrasse that have tested positive for these viruses have so far been co-habiting with clinically affected salmon which were likely the original source of infection. Both viruses are widespread in Irish salmon farming and the overall increase in risk posed by wild caught wrasse is considered acceptable.

Bacteria: Atypical *Aeromonas salmonicida* A-layer types 5 and 6, *Aeromonas salmonicida* ssp. salmonicida, *Vibrio anguillarum*

Atypical furunculosis has been recorded in farmed salmon and wrasse at sea in Ireland and has caused mortality in wrasse. The strains of atypical *Aeromonas salmonicida* affecting wrasse and lumpfish are subtypes that have not been reported in salmon to date and which appear to be host species specific, though there are recent anecdotal reports of subtype 3 in both salmon and lumpfish (not connected). The risk of species cross-over is considered low and atypical strains are known to be common in some wild fish populations in Ireland. The risk of introducing new strains or increasing the overall risk posed by atypical furunculosis in Ireland is considered low and acceptable if fish are screened as outlined.

Typical furunculosis (*Aeromonas salmonicida* subspecies *salmonicida*) is a significant disease of salmon, lumpfish and cases of mortality are reported in wrasse. However, wrasse are considered less susceptible than salmon and all known cases have been attributed to cohabitation of wrasse with infected salmon. This species is present in the marine environment in Ireland but there are no reports in wild wrasse. Most salmon stocks are vaccinated. The overall risk increase posed by use of wild caught wrasse in Ireland is considered very low and acceptable if fish are screened as outlined.

Vibrio vaccines and appropriate husbandry practices have ensured that vibriosis has not been a concern in finfish aquaculture in Ireland for over 20 years. Vaccinated salmonid susceptibility to vibriosis is low or insignificant. *V. anguillarum* is present in Ireland and has been isolated from wrasse in sea pens, but the risk posed by this pathogen is considered low and acceptable if fish are screened as outlined.

Parasites and fungi: *Neoparamoeba perurans*

N. perurans, the causal agent of amoebic gill disease, is endemic in farmed salmon in Ireland and has also been problematic in wrasse at sea. *N. perurans* is endemic in Irish salmon farming and the overall risk increase posed by introduction through wild caught stocks is considered very low and acceptable if fish are screened as outlined.

In conclusion, currently there have been no recorded incidents of significant disease problems arising as a result of disease transmission from wrasse to salmon. In general, and as far as the current state of knowledge has established, the disease risks associated with farming and cohabiting the species in Ireland are considered low.

The risk assessment framework used here has been adapted from AQUIS (1999) and based on Annex 3, code of good practice, Scottish fin fish aquaculture (2015).

AQIS (Australian Quarantine and Inspection Service) (1999) Import risk analysis on non-viable salmonids and non-salmonid marine finfish. AusInfo, GPO Box 1920, Canberra ACT 2601.

O.I.E. (Office International des Epizooties) (2015) Section 2. Chapter 2.1. Risk analysis. Aquatic Animal Health Code, World Animal Health Organisation, Paris. http://www.oie.int/en/international-standard-setting/aquatic-code/access-online/