POMS 2024 Response – surveillance, testing and management options:

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Animal Biosecurity and Welfare Branch

Key Points:

- Ostreid Herpesvirus-1 (OsHV-1) the virus responsible for Pacific Oyster Mortality Syndrome (hereafter referred to as 'POMS'), was detected in St Helens on 12/02/24 and both Georges Bay and Moulting Bay are now classified as 'POMS Infected'.
- The source and exact time of disease introduction is unknown.
- Since 12/02/2024, POMS testing performed at all nurseries and hatcheries which supply St Helens have been negative. Spat from the St Helens nursery have also tested negative.
- Two movements of oysters from the St Helens nursery into the Smithton area occurred during November 2023 and January 2024.
- Four movements of oysters from St Helens into a lease in Eaglehawk Neck, Norfolk Bay, occurred between 17/01/2024 - 07/02/2024.
- All of these consignments, comprised of triploid stock, have since tested negative for POMS.
- **The recommendation is that Smithton and Norfolk bays retain their respective POMS status (free and intermediate, respectively) with no further programmed testing but with careful vigilance of all leases, and prompt investigation of any unusual morbidity or mortality event.**
- There is a level of risk for further disease spread associated with this approach which can be mitigated, but not eliminated, by additional industry-funded testing of oysters.
- Biosecurity Tasmania may fund disease investigation of oyster ill-health or mortality by directing and funding laboratory testing to exclude emergency diseases. Broader investigations of non-notifiable endemic causes of disease will need to be covered by industry.

Situation:

Ostreid Herpesvirus-1 (OsHV-1) the cause of the Pacific Oyster Mortality Syndrome (hereafter referred to as 'POMS') was first detected in St Helens on 12/02/24. Producers in the area first noticed oyster mortalities on approximately 04/02/2024. POMS is endemic to parts of southeast Tasmania and is managed under a Biosecurity Group Permit issued by the Chief Veterinary Officer. St Helens (Georges and Moulting bays) was previously classified at POMS free but is now classified as POMS infected, and therefore not permitted to move oysters to any bay of lesser risk.

The source and exact time of disease introduction is unknown. The index case may be 04/02/2024 when mortalities were first reported, or it may have been much earlier. These mortalities were observed in triploid stock, ranging from 10-30mm, located within Zone 1 of Georges Bay, which is operated by three lease holders. It is possible that the disease OsHV-1 may have been present earlier and clinical signs did not emerge until 04/02/2024, due to environmental stressors including high temperatures and low tides. Weather observations in St Helens from 04/02/2024 and 12/02/2024 indicate high water temperatures, high atmospheric temperatures, and low daylight tides. It is worth noting that since November 2023, water temperatures recorded in St Helens

frequently exceeded 18°C, an environmental trigger that is expected to contribute to the expression of a POMS events if the OsHV-1 pathogen was present prior in St Helens, prior to detection in February 2024.

Possible routes of introduction include, but are not limited to, oyster and oyster equipment movements, human activities (bait, oyster translocation, boating activities). Direct spread through feral oyster populations or water column is thought to be less likely, due to the distance of St Helens from known infected oyster populations. The exact source of introduction may never be determined.

Since 12/02/2024, POMS testing performed at all nurseries and hatcheries which supply St Helens have been negative. Spat from the St Helens nursery have also tested negative for POMS. The testing method used a random sample of 30 oysters per facility, which could be expected to detect disease if present at a prevalence of greater than 10% and if it is evenly distributed in a homogeneous population. This is a basic level of disease freedom assurance.

Preliminary tracing and testing results:

Feral oysters were sampled from areas located west and south of zone 1 in Georges Bay on approximately 12/02/2024 and 21/02/2024. Almost 100% of these oysters returned positive PCR test results for OsHV-1, confirming that the virus is present in areas extending west and south from Zone 1 in Georges Bay. Given the high density of these feral oysters, it is likely that they could produce a large amount of virus if appropriately stressed. OsHV-1, once established in a favourable marine environment, is impossible to eradicate.

Tracing efforts have revealed two movements of oysters out of St Helens into other areas classified POMS free (Smithton) during late 2023 and early 2024, as well as several oyster stock movements to a lease located within a POMS intermediate area in Eaglehawk Neck, Norfolk bay.

One stock movement out of St Helens nursery to Smithton occurred in early January 2024, while an earlier movement occurred during November 2023. It is unknown if OsHV-1 was in St Helens or the nursery at the time of these oyster movements. Samples from each of these recipient populations were submitted to the Animal Health Laboratory and they tested negative for OsHV-1.

Given the large number of oyster translocations from St Helens into Eaglehawk neck, during the period leading up to the St Helens detection, it is possible that the virus may have accompanied one of these movements. Samples from the recipient lease in Eaglehawk neck were submitted to the Animal Health Laboratory and they have been negative for OsHV-1.

Surveillance objectives:

Since the initial detection of OsHV-1 in Tasmania in January 2016, Biosecurity Tasmania has worked with the Tasmanian oyster industry to mitigate the impact of the disease. The management program includes zoning oyster-growing areas into POMS free, intermediate risk and infected areas, based on disease detection results and multi-year surveillance testing.

Historically, Smithton has been classified as POMS free due to the absence of any unusual morbidity or mortality events, as well as significant distance from known POMS infected areas. Oyster samples collected from Smithton in 2024 yielded negative test results for OsHV-1. Norfolk bay is classified POMS intermediate due to proximity to an infected area, but the virus OsHV-1 has not been detected in this bay.

OsHV-1 can be moved from one body of water to another through the movement of live Pacific oysters and/or contaminated equipment. The disease is also expected to gradually increase its range

through natural spread in water via infection of feral oysters and/or unidentified reservoir hosts, as well as through increased human activities. Under the zone/movement control program, movements of oysters and oyster equipment are only permitted to areas of the same or higher risk, to reduce the risk of OsHV-1 introduction to areas previously free of POMS.

The experience in Tasmania since 2016 is that the virus has not spread appreciably until now, but persists in the environment where established. This is largely thought to be due to the maintenance role of mature Pacific oysters (feral) in the marine environment.

After the detection of OsHV-1 in St Helens, there is a risk that the virus has already spread to other POMS free and intermediate status areas through the legal movement of oysters from this previously POMS free area. The source and exact time of disease introduction is unknown. The index case may be 04/02/2024 when mortalities were first reported. It is possible that the disease OsHV-1 may have been present earlier and clinical signs did not emerge until 04/02/2024, when sufficient environmental stressors were present. Fluctuating water temperatures (particularly > 16°C), rapid changes in salinity, and changes in oyster nutrition, are recognised stressors for oysters and the expression of POMS, especially juvenile stock. The presence of stressors is relevant for future surveillance because they may lead to increased expression of OsHV-1 in oysters and improve the ability to detect the virus.

The objectives of surveillance include:

- Provide evidence of absence of OsHV-1 in previously POMS free areas which received oysters translocated from St Helens (trace locations).
- Provide evidence of absence of OsHV-1 in previously POMS Intermediate areas which received oysters translocated from St Helens (trace locations).
- Results from surveillance are used to support management efforts to prevent further translocation from trace locations to other recipient areas currently considered free from virus.

It is not technically possible to determine freedom from disease in a population with 100% certainty unless every individual animal were screened for OsHV-1 using a perfectly accurate test. This surveillance plan discussion will provide a range of options for surveillance with differing costs and levels of confidence of disease absence to assist the oyster industry in managing the expanding range of OsHV-1 for all Tasmanian oyster growers. It is important to consider the likelihood that bay status will continue to change in the context of the expanding distribution of OsHV-1 in Tasmania and the globe, as well as the increasing occurrence of environmental stressors which contribute to the dissemination of OsHV-1 and the expression of POMS disease events.

Table 1: Sampling/ laboratory testing options:

Surveillance method	Advantages and limitations	Test Cost
Passive surveillance – careful observation and prompt investigation of unusual morbidity or mortality events in oysters. Samples submitted for POMS testing from disease events	• Most cost-effective option, best option for early detection. • OsHV-1 is more likely to be detected in clinically affected animals. • Once detected, disease may have been present for some time. Does	• **OsHV-1 qPCR costs are $69.46*/test**. Total cost varies based on sample number and the dissection costs, as well as any

	not prevent risk of disease translocation from a free area by movements of asymptomatic oysters.	other disease investigation costs.

Active surveillance – single random sample of oysters from a population (lease, nursery or hatchery.	• In general, a higher sample number provides greater assurance for detecting a disease if present at a lower prevalence
	  ○ A random sample of 30 oysters is expected to detect disease at a 10% prevalence, (assumes a perfect test – current tests are not 100% accurate - and correct random sampling method) with an ~10% risk of error
	  ○ Pooling animals in groups of five may reduce the likelihood of detecting the virus, when compared to testing each animal individually
	• This sampling method is useful for one-off testing of enclosed/biosecure populations (hatcheries, nurseries) where disease expression among 10% of animals would be expected if OsHV-1 were present.
	• This method does not provide proof of disease freedom in populations where the disease is not evenly distributed in the population, or among populations of differing susceptibility (e.g. different ages, POMS-resistant oysters, feral oysters, etc)
	• Only provides a "snapshot" of POMS status (i.e. disease status at the time of sample collection)
		• $69.46 x 30 is an estimated $2,083.30*
		• Pooling: (pooled = 5 animals/test); 6 x $69.46 = $416.76*

Active surveillance – movement testing	• Single random sample (similar to above) of 30 from a population prior to translocation. • Helps further demonstrate absence of OsHV-1 in the source population, reducing the likelihood that disease will be translocated.	• Costs as described above

	• Could be undertaken by individual producers to mitigate the risk of introducing POMS onto their lease	
Active surveillance – <u>bay/area evidence of freedom</u> • Sequential random samples taken from population(s) • at least two occasions per season over two consecutive years • Sampling at time of high water temperature to optimize detection • Samples tested in duplicate to provide greater assurance	• Provides higher level of confidence of freedom from disease (although cannot provide 100% confidence). • Presence of high temperature increases probability disease will be detected if present. • Requires careful consideration of additional design methods including sample randomization, bay hydrology, and presence of feral oysters • Only provides information for the season(s) in which surveillance occurs. Further surveillance would be required to detect new incursions. • Information derived may be used to guide bay POMS classification. • Expensive • Time consuming	• $92.46 x 150 (assay cost higher as samples are *tested in duplicate*) = $13,869; four surveys over two years = $55,476* per surveyed area.

**assay cost only, does not include the laboratory costs for oyster dissection*

Use of more than one surveillance method is strongly advised to provide ongoing information about disease status.

Assessment and options for further action: Smithton

Smithton is currently considered POMS free due to the absence of any observed unusual morbidity or mortality events, as well as its significant distance from known POMS infected areas. Smithton received oyster stock from St Helens in late 2023 and early 2024, prior to POMS detection in St Helens. The index date for POMS infection in St Helens is not known, however it is possible that OsHV-1 could have been present in St Helens prior to disease detection on 12/02/2024.

Initial oyster samples collected from Smithton leases that received stock from St Helens have yielded OsHV-1 negative results. Smithton growers have been asked to voluntarily hold off on any planned movements to POMS free or POMS intermediate areas until agreement on the true status of the Smithton bays area is reached.

It is possible for Smithton growing areas to have been infected with the virus without exhibiting disease. For example, if sufficient contributing environmental stressors are absent, if susceptible oysters are not exposed to infected oysters, or if the introduced dose of the virus was very small, then OsHV-1 detection may be extremely difficult. The disease agent is capable of being present and undetectable within a marine area. Further testing and time are required to determine the status of this bay more definitively. Currently, there is no evidence to suggest the virus is present in Smithton. It is worth noting that since December 2023, water temperatures recorded in Smithton have frequently exceeded 18°C, an environmental trigger that should contribute to the expression of a POMS events if the OsHV-1 pathogen was present.

Triploid stock located in Smithton may be effective sentinels, as these oysters have no known POMS resistance and are more likely to succumb to POMS. Bays experiencing higher water temperatures, particularly if sustained >18°C for two weeks, are also at a higher risk for exhibiting POMS if OsHV-1 is present.

The whole of Smithton's three bays, Montagu Bay, Big Bay, and Duck Bay will need to be considered as a single epidemiological unit.

There are 3 main surveillance and management options (with variations) and several management options with differing levels of risk, assurance of disease freedom, and costs.

Table 2: Smithton Sampling Options:

Surveillance method	Management method	Comments	Costs
1. Passive surveillance no required testing, but careful vigilance and prompt investigation of any unusual morbidity or mortality event	Retain POMS free status based on absence of disease observation in the presence of known risk factors (high temperatures, presence of susceptible oysters)	If OsHV-1 were present at low levels, this method may not manage the risk of translocation from Smithton into other areas.	Varies; based on number of animals submitted and tests performed during an investigation. OsHV-1 testing would be required, and histopathology to investigate other cause for disease.
2. Passive surveillance with oyster movement testing careful vigilance and prompt investigation of any unusual morbidity or mortality event Requirement for testing for movement from area	Retain POMS free status but **require OsHV-1 movement testing** (random sample of 30 oysters test negative to OsHV-1) prior to movement to intermediate and free areas for next 12 months (one more summer). Managed through an Individual Biosecurity Direction.	-Provides better assurance for recipient leases that translocated oysters are free from disease. -May not detect disease present at low rates in unsampled populations (e.g. feral oysters). -Provides cumulative data of disease absence within the population of source oysters.	30 animals = $2,083.30* Pooling (pools are 5 animals/test) = $416.76*
3. Passive surveillance as for options 1 and 2, and: **Active surveillance** Following the method previously proposed to Oysters Tasmania for bay sampling (four surveys over two	Change Smithton classification to POMS intermediate pending results of active surveillance to revert to POMS free.	-Provides best assurance of disease absence going forward. -Cannot prevent spread of OsHV-1 through non-oyster cultivation routes or natural increase in OsHV-1 range distribution. -Time consuming -Expensive	$55,476* per surveyed area (includes four sampling events).

consecutive summers)			

** assay cost only, does not include the laboratory costs for oyster dissection*

All movements of oysters to other leases will still need to satisfy the requirements of the current Biosecurity Group Permit.

Recommendation:

Smithton retains POMS free status based on the absence of observed disease in the presence of known environmental triggers (including high water temperatures). This free status requires maintenance of producer vigilance for oyster health, as well as prompt, industry-funded investigation of any unusual morbidity or mortality event(s). Investigation of unusual morbidity and mortality events includes testing for endemic diseases, as well as investigation of diseases exotic to Tasmania.

It is acknowledged that there is a low, but not zero risk, that infected stock entered the Smithton body of water, and that OsHV-1 is present but undetected. This means there is a low risk that disease may be translocated onwards from Smithton if movements are permitted on the assumption of a POMS free status.

If greater assurance is desired, additional active surveillance may provide evidence to support the absence of OsHV-1 in Smithton bays. Please review table 2 for these options and limitations. "Discussion on sampling number for oyster surveillance of OsHV-1 on a bay area basis" (addendum 1) provides more detail.

It is important to consider bay status, in the context of the expanding distribution of OsHV-1 in Tasmania and throughout the globe. It is possible for the disease to enter previously unaffected areas, despite POMS zoning and movement controls.

Assessment and options for further action: Norfolk Bay

Norfolk bay is classified as POMS intermediate and is treated as a single unit. This status has not changed since the St Helens detection, as testing of trace sites has not detected OsHV-1. Furthermore, at the time of writing, there have been no reported mortality events in Norfolk Bay, nor any evidence supporting the transfer of virus from the St Helens' detection.

A lease in Eaglehawk Neck (EHN) received multiple shipments of mid growth oysters from St Helens bays during the first six weeks of 2024. It is possible for Norfolk bay to have been infected with the virus without exhibiting disease. For example, if sufficient contributing environmental stressors are absent, if susceptible oysters are not exposed to infected oysters, or if the introduced dose of the virus was very small, then OsHV-1 detection may be extremely difficult. The disease agent is capable of being present and undetectable within a marine area. It is worth noting that bay temperatures in EHN have mostly been >16°C since November 2023. These high water temperatures pose an environmental stressor that would be expected to increase the likelihood of observing a large POMS event if OsHV-1 were present in the bay.

There are three main options (with variations) with differing levels of risk, assurance of disease freedom, and costs distribution.

Surveillance method	Management method	Comments	Costs
1. Passive surveillance no required testing, but careful vigilance and prompt investigation of any unusual morbidity or mortality event	Retain POMS intermediate status based on no observation of disease with known risk factors (high temperatures, presence of triploid stock)	-If the disease is present but not detectable, then the disease may be translocated into other Intermediate areas.	Varies; based on number of animals submitted and tests performed during an investigation. OsHV-1 testing would be required, along with histopathology to investigate other cause for disease.
2. Passive surveillance with oyster movement testing no required testing, but careful vigilance and prompt investigation of any unusual morbidity or mortality event Requirement for testing for movement from area	Retain POMS Intermediate status but require **OsHV-1 movement testing** (random sample of 30 oysters test negative to OsHV-1) to any intermediate and free areas for next 12 months (one more summer). Managed through an individual biosecurity direction.	-Provides better assurance for recipient leases that translocated oysters are free from disease -May not detect disease being present at low rates in unsampled populations (e.g. feral oysters). -Provides cumulative data of disease absence within the population of source oysters.	30 animals = $2,083.30* Pooling (pools are 5 animals/test) = $416.76*
3. Passive surveillance as for options 1 and 2, and: **Active surveillance** Following the method previously proposed to Oysters Tasmania for bay surveillance (four surveys over two consecutive summers)	Change Norfolk Bay classification to POMS Infected pending results of active surveillance to revert to POMS Intermediate or POMS Free.	-Provides best assurance of disease mitigation going forward -Cannot prevent spread of OsHV-1 through non-oyster cultivation routes or natural increase in OsHV-1 range distribution -Upon completion of extensive testing, bay status could be changed to POMS free -Expensive	$55,476* per surveyed area (includes four sampling events).

Recommendation:

Norfolk Bay retains POMS intermediate risk status based on the absence of observed disease in the presence of known environmental triggers (including high water temperatures). This intermediate status requires maintenance of producer vigilance for oyster health, as well as prompt, industry-funded investigation of any unusual morbidity or mortality event(s). Investigation of unusual morbidity and mortality events includes ruling out endemic diseases, as well as investigation of diseases exotic to Tasmania.

It is acknowledged that there is a low, but not zero risk, that infected stock entered the Norfolk Bay body of water, and that OsHV-1 is present but undetected. This means there is a low risk that disease may be translocated onwards from Norfolk bay if movements are permitted on the assumption of a POMS intermediate status.

If greater assurance is desired, additional active surveillance may provide evidence to support the absence of OsHV-1 in Norfolk bay. Please review table 3 for these options and limitations. Further discussion on the limitations of bay testing is detailed in the document "Discussion on sampling number for oyster surveillance of OsHV-1 on a bay area basis" (addendum 1).

Funding for surveillance and/or control measures

After the initial incursion of OsHV-1 into Tasmania in 2016, the emergency response by the Tasmanian government and oyster industry aimed to determine the source and extent of infection, as well as prevent further spread of the disease through zoning and movement controls. The disease became established in areas of southern, eastern and now north-eastern Tasmania. It is not possible to eradicate the OsHV-1 pathogen from a body of water once it has been detected, and the disease is expected to further expand its range in the future.

As the infected areas becomes more extensive, movement controls may impede the translocation of stock for production purposes. The relative cost of surveillance and control measures will likely increase, while the benefits conferred by maintaining free areas may become marginal. Based on a cost-benefit analysis, industry may then choose to move towards a mitigation strategy to reduce the occurrence and severity of POMS outbreaks, as described within the Department of Agriculture *Aquavetplan Disease Strategy Infection with OsHV-1* (Agriculture, 2015).

While government has a direct role in response to emergency animal disease incursions, once a disease is established and considered not eradicable, then the use of government funds to control the disease must satisfy a clear public good purpose. Governments do not fund control programs for endemic animal diseases in the absence of clear, quantifiable public or industry benefit.

Currently, there are no funds allocated for government to perform surveillance for OsHV-1. It is expected that the costs of surveillance to support biosecurity measures between oyster growing zones, or for investigation of unexplained morbidity and mortality among oysters, will be covered by the affected producer as business costs associated with the management of an endemic disease.

Addendum 1:

References:

Agriculture, D. o. (2015). *AQUAVETPLAN Disease Strategy: Infection with ostreid herpesvirus-1 microvariant (Version [1]).* http://www.agriculture.gov.au/animal-plant-health/aquatic/aquavetplan