

Infectious Hematopoietic Necrosis Virus (IHNv) is enzootic to salmonids in the Pacific Northwest. This virus has been identified in cultured Atlantic salmon in saltwater net pens in British Columbia and a variety of wild non-salmonid species.

Preventing the Secondary Spread of IHNv

Based on studies of IHNv in British Columbia, it is known that the virus can be present in stocks before a rise in mortality is seen and normal farm management activities may present a risk for inadvertent movement of this agent. Hence, once IHNv has been diagnosed on a site, the following actions should be taken to reduce the secondary spread of the disease:

Immediate Farm/Operator Procedures: Isolation of Affected Sites

1. Affected farm(s) should immediately be deemed isolated site(s). Affected farm(s) and those within a 3 kilometer radius or within a distance established by water current data as “at risk” for exposure to infection should be designated an “IHNv Positive Zone”.
2. Farms are required to contact the BC Ministry of Agriculture, Fisheries and Food Fish Health Veterinarian and/or Chief Veterinarian in the event of a positive diagnosis of IHNv.
3. Farms within the IHNv Positive zone should be contacted and informed of the diagnosis or suspect diagnosis.
4. All regular contract marine freight services that provide services to multiple operations (i.e. feed barges) should be contacted and informed of the diagnosis or suspect diagnosis.
 - Non-essential deliveries should be halted
 - For essential deliveries (i.e. fuel, feed); affected sites should be the last site delivered to prior to returning to its home base where the vessel’s decks can be cleaned and disinfected.
 - If multiple sites affected; a vessel exclusively dedicated to these sites should be put in to service.
 - All pumping of water by larger vessels (i.e. for ballast, engine cooling etc) must occur outside the “IHNv Positive zone”. Preferred water intake locations would be upstream from affected sites, mid-channel.

5. Operators should immediately halt the movement of any fish, vehicles, equipment and personnel from the affected site(s) to any other site(s).
6. Access by non-essential staff and/or visitors to the affected site and other farms within the IHNv positive zone should cease.
7. Fish Health staff or veterinarian should co-ordinate an intensified sampling program for the affected farm as well as farms in the immediate area or within the zone of exposure to the affected sites to determine the distribution of the disease. This sampling should include a review of the records to identify if fish have been moved to other sites and/or areas as these groups should be part of an intensified sampling program.
8. Movement of staff from the affected site(s) and other farms within the zone should cease. Any essential staff for site operations and qualified fish health professionals moving to and from affected site(s) or within the positive zone should take the following precautions:
 - Minimize movements to affected site/zone such that the affected site is the only site visited or is the last site visited in a day.
 - All protective gear (boots, raingear etc) should be thoroughly disinfected or separate gear should be used at each of the affected and unaffected sites and left on that site.
 - Boats used to transport people and equipment to sites should be thoroughly disinfected and thoroughly cleaned to remove all debris and organic material and disinfected before movement to other sites. Operators may chose to designate a boat for the affected site and/or area.

Handling Fish from the Affected site or within the IHNv positive zone

1. Depending on the mortality rate, dive frequency should be increased to ensure rapid removal of all dead and dying fish. If mechanical mortality removal systems (Examples: mort rings or uplift systems) are used to increase disposal of affected fish, efforts should be made to contain all infected organic materials on the affected site.
2. All persons and equipment used for removal of mortalities and infective material should be cleaned and disinfected. Surfaces that come into contact with infected material should be cleaned and disinfected.
3. Personal assisting in mortality removal should wear clothing (i.e. rain gear), hand and footgear that can be easily cleaned and disinfected.
4. If possible, divers should be designated to dive at the affected site(s) or within IHNv positive zone only. If divers must go between infected and uninfected sites within the positive zone, the affected site(s) should be dove last. Preferably separate dive gear should be used for affected sites. However if divers must move between sites they must ensure that all equipment and gear is thoroughly disinfected between site dives.

5. Depending on the overall morbidity rate, farms should attempt to remove all visibly sick, slow swimming or moribund fish from the surface of the pens. If the morbidity rate is high, this may not be feasible.
6. Mortalities should be disposed of in tight lidded, secure containers to avoid any loss of fish or infected material and to prevent access by birds and other predators.
7. Collection of mortalities by the mort barge should be done frequently and operator of the barge should be instructed to collect mortalities at the affected sites last and ensure thorough disinfection of all surfaces and equipment in contact with the affected mortalities before proceeding between sites. Mortality barges should not be used to transport smolt or used for supply delivery (i.e. feed) if being used for mortality disposal.
8. In instances where slaughter and total removal of all affected fish is chosen as a disposal option, the following must be completed:
 - All bloodwater must be contained and treated to ensure destruction of the virus (Section 3 Harvesting Procedures).
 - Dead fish should be transported using a vessel that ensures complete containment of all infected materials and allows no water exchange with marine environment.
 - Fish should be disposed of to an approved disposal facility. Proper composting and rendering will provide for destruction of virus in affected mortalities.
9. Operators are encouraged to notify other facilities and companies (including transport companies) within the IHNv positive zone and directly contact any farms that may have received fish and/or equipment from the affected site and/or neighbouring farms/facilities if there is a risk of exposure from the affected fish involved in the outbreak.
10. Operators should avoid transportation of unaffected fish through affected IHNv zone. Where required, precautions should be taken to ensure that no water exchange occurs around affected farm sites and if possible, within affected zone. Fish should be closely monitored for signs of IHNv for at least three weeks subsequent to transport.
11. Vessels used to transport affected fish for harvest or mortality disposal should not be used for transport of live unaffected fish. If vessels must be used for both procedures, efforts must be made to transport unaffected fish first and ensure complete disinfection of vessel post transport of affected fish/mortalities.

Other Mitigative Procedures

1. Fish from affected sites should not be used for broodstock.
2. Sites that have experienced an outbreak of IHNV should remain fallow for a minimum of three months post the date of removal of the last infected fish from last affected site prior to re-stocking fish into the site. For IHNV positive zones where multiple sites are affected a coordinated fallow period and restocking program should be established.
3. Once the site or an IHNV positive zone has been re-stocked, fish should be monitored for the presence of the virus up to three months post the last day of stocking.
4. As Chinook salmon may harbour the virus without experiencing clinical disease, Pacific salmon farms within a positive IHNV zone should also monitor stocks for the presence of the virus.

Other Disinfection Procedures for IHNV Infected Sites

1. Footbaths and if practical, hand wash stations, should be maintained at and used by all personnel before getting on and leaving the site. These footbaths should be located at all boat docking points. They should be clearly visible and marked.
2. Footbaths should be kept clean at manufacturers recommended levels and changed regularly. A record should be kept of these changes.
3. All mort bags should be thoroughly disinfected between pens and before re-hanging on cages. This includes sites that use one bag per pen. In addition all hand rails, nets and walkways that come in contact with the mort bags should be disinfected.
4. All fish health personnel should disinfect all rain gear, field kits, and boots before getting on and leaving the site. Each site should maintain a separate disinfectant bucket and brush for visiting fish health personnel.
5. Any fish and sampling and / or dissection must be done in a tote to prevent blood, mucous, feces, etc. from leaking on the site and back into the system.
6. All tanks and dive bags should be disinfected before bringing onto the site. Before leaving the site, all dive gear should be thoroughly disinfected. This includes tenders and active divers.
7. Mort tanks have to be properly closed. A disinfection station should be present at the mort float. The outside of the tanks should be disinfected after depositing the mortals. The mort totes/buckets should be thoroughly cleaned and disinfected at the float.

Recommended Procedures for Processing and Harvesting Fish Infected with IHN

Harvesting or processing of affected fish will require special precautions to prevent the spread of the virus through mortalities and other infectious materials. It is recognised that factors such as the size and age of the fish, proximity of the farm to the processing plant, disinfection capabilities at the farm and the processing plant, and method chosen for harvest will dictate the precautions required. In light of this, the following guidelines are recommended:

1. Operators moving fish to a processing facility should ensure that boats or vehicles do not release water from transport tanks between the facility or farm and the processing plant.
2. Stunning and bleeding for harvest of fish at affected sites should be done in a manner that minimises the loss or spillage of water, ice or blood water. Operators should take precautions to avoid overfilling totes that can lead to spillage from harvest containers. Harvest totes or containers should be fitted with secure lids prior to transfer on to transport vessels. All surfaces that come into contact with infected materials and or fish should be cleaned and thoroughly disinfected.
3. Operators transporting harvesting or processing fish should contain all water, blood water and processing waste for disinfection or disposal to landfill.
4. Water used for fish processing should be pumped onto land, contained and disinfected. To ensure complete disinfection solids should be removed and disinfection applied to remaining effluent water.
5. Suitable methods for disinfection include UV, ozone, and chlorination/dechlorination. If chlorination and dechlorination are utilised, residual chlorine levels in processing water should be less than 0.01 mg/l.
6. Alternate methods such as ultraviolet radiation and ozonation will be considered on a case by case basis. Processing facilities using alternative disinfection methods should test to ensure destruction of the virus in effluent water.
7. Residual water remaining in the transport vessel should be disinfected by the above standards before discharge.
8. All processing and transportation equipment should be thoroughly disinfected after processing is completed. Where possible, operators should avoid using the same vessels to transport affected and unaffected fish.