

Questions and Answers: Infectious Salmon Anemia

Infectious salmon anemia (ISA) is a serious viral fish disease that affects farmed Atlantic salmon in several areas of the world. The U.S. Department of Agriculture’s (USDA) Animal and Plant Health Inspection Service (APHIS) works with fish health partners to help protect U.S. aquaculture and wild fish populations from this disease.

About ISA

Q. What is ISA?

A. ISA is a viral disease that causes severe anemia in infected fish. The fish may develop pale gills, raised scales, pinpoint areas of bleeding, a bloated abdomen, or bulging eyes, and may swim close to the water surface. The disease can also develop without infected fish showing any external signs of illness—the fish maintain a normal appetite and then suddenly die.

Because the signs of ISA are not unique and can occur with other fish diseases, testing for virus presence is the only way to tell if a fish has ISA.



Q. Which fish are most susceptible to the ISA virus?

A. ISA has caused high death rates in Atlantic salmon under marine farmed and laboratory conditions, but the virus has not been associated with die-offs in wild fish or freshwater farmed populations. Several species of marine and freshwater fish can be infected with ISA without showing any apparent signs of disease. Susceptible fish under stress due to human handling or environmental conditions may be more prone to the disease.



Q. Where was ISA first detected?

A. Outbreaks of ISA were first identified in Norway beginning in 1984. Since then, outbreaks in farmed Atlantic salmon have occurred in eastern Canada,



Chile, the Faroe Islands, Maine, Norway, and Scotland.

Q. Can people get ISA?

A. No. Fish with ISA pose no human health threat.

Q. Can you cure ISA?

A. There is no cure for ISA. However, in farmed Atlantic salmon, producers can manage the disease by conducting regular surveillance, coordinating the stocking of farms in shared waters, leaving sites empty of fish between production cycles (fallowing), cleaning and disinfecting net pens and equipment between uses, employing proper quarantine measures, following good fish husbandry practices, and promptly removing infected fish. Salmon farmers can help prevent ISA by purchasing eggs and brood stock that are proven to be free of the ISA virus. Together, these steps reduce the risk of ISA outbreaks in farmed Atlantic salmon.

Q. Is ISA present in the United States?

A. ISA was found in Maine in 2001. In 2002, Federal and State partners began a surveillance and control program to look for the disease and detect and prevent its spread in farmed Atlantic salmon. This program is highly successful—there have been no confirmed cases of ISA in the United States since early 2006. However, a non-disease-causing form of the ISA virus (ISAV HPRO) is periodically detected in wild and farmed Atlantic salmon in this region of Maine.

ISA and the U.S. Pacific Northwest

Q. Is ISA found in the U.S. Pacific Northwest?

A. No. Neither the disease nor the virus has ever been confirmed in the U.S. Pacific Northwest. While some media and a recently published research finding (Kibenge et al. *Virology Journal* 2016



13:3) reported ISA virus detections in salmon from fish markets and wild populations in British Columbia, neither the Canadian Food Inspection Agency (CFIA)—which oversees fish health in Canada—nor a World Organization for Animal Health (OIE) reference laboratory has confirmed the findings.

Q. How did we address ISA concerns in the U.S. Pacific Northwest?

A. In response to concerns about the possible occurrence of ISA in the U.S. Pacific Northwest, the U.S. Aquatic Animal Health Task Force—which is led by APHIS and includes the National Marine Fisheries Service and the Fish and Wildlife Service—collaborated with Federal, State, and tribal agencies to develop and carry out an enhanced surveillance plan for ISA virus in the region. APHIS and its partners have completed the sampling and testing outlined by the plan with more than 4,000 fish tested in 3 years. Sampled fish included wild Pacific salmon, herring, and trout from coastal regions of Alaska and Washington and farmed Atlantic salmon from Washington. All tests were negative for ISA virus.

Q. What was the focus of the enhanced surveillance plan?

A. The plan detailed how fish health managers would look for the ISA virus and which screening tests to use. It built on existing Federal, State, tribal, and industry health infrastructures and activities.

Q. Are details of the U.S. Pacific Northwest sampling and testing efforts available?

A. In 2014, a paper titled “U.S. Response to a Report of Infectious Salmon Anemia Virus in Western North America” was published. It provided an interim report on the surveillance. APHIS and its partners are now drafting a final report. Once completed, the agency will share the report with stakeholders.

Q. Are the U.S. and Canadian surveillance efforts for ISA similar?

A. Both countries use OIE-recommended testing methods for detecting the ISA virus. APHIS is working with CFIA and Canada’s Department of Fisheries and Oceans to make sure our countries’ surveillance efforts align and follow OIE recommendations.

Q. Why did we need an enhanced surveillance program? What were the benefits?

A. ISA is a serious disease of farmed Atlantic salmon. There is no scientific evidence that Pacific salmon are at risk, but the enhanced surveillance program would have helped to quickly detect the disease and contain or manage it if found. Early detection and control efforts better protect the health of farmed and wild fish and

reduce the potential for impacts to the aquaculture industry.

Q. What are the potential economic impacts of an ISA outbreak?

A. When ISA occurred in Maine in 2001 and 2002, 17 marine net-pen sites—containing about 1.5 million fish—were depopulated. The United States spent \$8.6 million combating ISA in Maine between 2001 and 2007, including the cost of indemnity to farmers for animals destroyed. If ISA were found in the Pacific Northwest (U.S. or Canadian) the economic impact would be significant.

Managing ISA

Q. What steps are fish producers taking to prevent and manage ISA?

A. There are several simple steps that fish producers use to help prevent ISA virus from infecting their facilities. These basic biosecurity steps include the following:

- Keeping equipment clean and disinfected and not sharing equipment between sites
- Not transferring fish between sites
- Quickly removing any potentially sick or dead fish
- Farming only one age group of fish at a time
- Controlling access to their facilities
- Obtaining eggs and brood stock that are tested free of the ISA virus
- Leaving sites empty of fish between production cycles (fallowing)
- Working together within the region to coordinate these practices among sites

These same steps would also help manage the disease if it were found at a facility.

Testing for ISA

Q. How do you know if a fish has the ISA virus?

A. Testing is the only way to know if a fish has the ISA virus. ISA testing is a multistep process that uses OIE-recommended methods.

Screening tests look for viral genetic material in fish tissues. If these tests show evidence of the ISA virus, laboratory officials conduct additional tests (e.g., genetic sequencing and virus isolation in cell cultures) to confirm infection.

Q. Who conducts the testing for ISA?

A. Several U.S. laboratories screen samples for ISA virus, following APHIS-approved test protocols. However, APHIS' National Veterinary Services Laboratories (NVSL) must confirm any presumptive positive cases. As the U.S. reference laboratory for animal diseases, NVSL has the expertise to make a final determination on whether the ISA virus is present.

More Information

Q. Where can I find more information about ISA and the ISA virus?

A. For more information about the ISA virus and ISA disease surveillance programs, go to:

- APHIS' Aquaculture Web page (https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/aquaculture/ct_aquaculture_index)
- CFIA's 2012-2013 Status Update on the Surveillance of Wild and Enhanced Anadromous Salmonids in British Columbia (<http://www.inspection.gc.ca/animals/aquatic-animals/diseases/reportable/isa/wild-anadromous-salmonids/eng/1410057185143/1410057186002>)

- "U.S. Response to a Report of Infectious Salmon Anemia Virus in Western North America" Paper (<http://dx.doi.org/10.1080/03632415.2014.967348>)
- Chapter 10.4 of the OIE Aquatic Animal Health Code, Infection with Infectious Salmon Anaemia Virus (http://www.oie.int/index.php?id=171&L=0&htmfile=chapitre_isav.htm)
- Chapter 2.3.5 of the OIE Manual of Diagnostic Tests for Aquatic Animals, Infection with Infectious Salmon Anaemia Virus (http://www.oie.int/index.php?id=2439&L=0&htmfile=chapitre_isav.htm)

