

Infectious Salmon Anemia, Maine, USA

March 23, 2001

Impact Worksheet

Summary:

The first identification of infectious salmon anemia (ISA) in the US has been made in an aquaculture pen near Treat Island in Cobscook Bay, Maine. ISA is a disease of Atlantic salmon caused by an orthomyxovirus. In 1999, the disease had been found in pens in New Brunswick, Canada that were only 3 miles from US pen sites.

In 1998, the US ranked 7th in the world for production of Atlantic Ocean salmon, trout, and smelts with a production level of 14,500 metric tons (MT) of these fish species, representing 2% of world production. Maine salmon account for approximately 18% of US consumption of farmed Atlantic salmon and approximately 2% of world consumption. Maine Atlantic salmon production in 1998 was 30 million pounds, estimated to be worth \$59.5 million. The vast majority of US exports of salmon and salmon products go to Canada. The identification of the virus in farmed Maine salmon has the potential to cause significant impact to the local Maine Economy

In response to the US ISA finding, all fish in the the affected cage have been slaughtered. Biosecurity has been increased including isolation of the affected cage and site, and daily removal of dead fish for burial in a landfill. Increased surveillance of neighboring cages, and disinfection of equipment have also been initiated.

How extensive is the situation?

The first identification of infectious salmon anemia (ISA) in the US has been made in an aquaculture pen near Treat Island in Cobscook Bay, Maine. In 1999, the disease had been found in pens in New Brunswick, Canada that were only 3 miles from US pen sites (see Infectious Salmon Anemia, Canada, Impact Worksheet, June 1999).

The ISA virus was detected in one of 6 cages stocked with about 68,000 smolts (young salmon). Fish deaths of about 150 fish per day three weeks following a bird predation event prompted a diagnostic investigation in which ISA virus was detected. Preliminary diagnosis was made by virus isolation, RT-PCR, and the indirect fluorescent antibody test. Biosecurity has been tightened including isolation of the affected cage and site, daily removal of dead fish for landfill burial, and slaughter of all fish in the affected cage. Increased surveillance of neighboring cages, and disinfection of equipment has been initiated.



On March 21, 2001 the Maine Aquaculture Association announced the adoption of an industry-wide Infectious Salmon Anemia Action Plan. The action plan is designed to ensure a consistent response across the industry in actions to contain and control

ISA. The action plan will create linkages between disease monitoring, audits by independent veterinarians, and site specific best management practices. The action plan makes specific technical recommendations designed to decrease the risk of ISA as well as establishing standards for ISA sampling, detection and reporting.

Infectious salmon anemia is a disease of Atlantic salmon caused by an orthomyxovirus. While this virus appears to only cause disease in Atlantic salmon, both wild and farmed, it can also infect the sea run brown trout, rainbow trout and other wild fish such as herring. Since its first isolation in Norway in 1984, it has also been found in New Brunswick, Canada in 1996, Nova Scotia in 1998, and in Scotland in 1998. ISA may also be called hemorrhagic kidney syndrome in Atlantic salmon.

Clinical signs of ISA generally appear 2 - 4 weeks after infection and include lethargy, swelling and hemorrhaging in the kidney and other organs, protruding eyes, pale gills, darkening of the posterior gut, and swelling of the spleen. Mortality is highly variable and can be from 2 - 50% over one production cycle, depending on stocking density, sea lice status, etc. Transmission occurs by direct contact, through parts from infected fish (mucus, blood, viscera, trimming, feces), contact with equipment contaminated with parts from infected fish, people who handled infected fish, and sea lice. Salmon pens within approximately 3 miles of infected farms or processing plants handling infected fish without adequate waste treatment have up to 13 times greater risk of becoming infected with ISA (Jarp 1997).

Risk factors for ISA infection are thought to include the following: proximity of less than 5 km to a processing plant; exposure to sub-optimally treated effluent from processing plants and blood water from harvesting operations; improper handling and disposal of dead and dying fish; and movement of farm personnel, divers, and equipment between multiple marine sites.

*Sources: U of Maine; Cooperative Extension Info Bullet, Summary Report of Meetings with Maine's Department of Marine Resources and Microtechnologies, Inc., regarding Infectious Salmon Anemia Threat to Maine's Farmed Salmon Industry, World Aquaculture; March/April 1999, and Drs. Steve Ellis, and Donald Hoenig; Bangor Daily News, 3/17/01; OIE Disease Information Report; News Release by the Maine Aquaculture Association; Jarp J, Karlsen E. Infectious salmon anemia (ISA) risk factors in sea-cultured Atlantic salmon *Salmo salar*. *Disease of Aquatic Organisms*, 1997;28:79-86*

What is the US' place in the international market for affected animals and animal products?

In 1998, the US ranked 7th in the world for production of Atlantic Ocean salmon, trout, and smelts with a production level of 14,500 metric tons (MT) of these fish species. Norway, at a production level of 408,000 MT, is the leading world producer of Atlantic Ocean salmon, trout, and smelts. The US production of Atlantic Ocean salmon, trout, and smelts represents 2% of world production.

Source: United Nations FAO

What is Maine's production and trade in affected animals and animal products?

Maine salmon account for approximately 18% of the US market of farmed Atlantic salmon and approximately 2% of the world market. It is estimated that the 1998 Atlantic salmon production in Maine was 30 million pounds, with a value of \$59.5 million. Preliminary processing on-farm added an additional \$10 million to this value. The Maine salmon industry provides 2500 jobs, primarily in Washington and Hancock counties, generating \$140 million in person income.

Hatcheries throughout the state produce about 3.5 million fish a year for the net-pen operations along the coast. Net pens are 20 feet deep with the large pen systems covering several acres of surface water. A farming operation with 2.5 acres of net pens can produce about 50,000 fish each year for market. There are currently 28 saltwater (grow-out) sites in Maine, located primarily in Washington and Hancock counties, where excellent water quality, protected bays, water temperatures of 0 - 15C (32 - 59F), strong currents, and high tides provide ideal conditions for raising salmon.

In November 2000, wild Atlantic salmon in eight Maine rivers were added to the federal endangered species list. Protection under the act means it is now a federal violation to take salmon in the eight rivers. One proposed rule under the Endangered Species Act would ban net-pen operations within 12 miles of river mouths. The economic impact of the act's ruling on the Maine salmon industry is difficult to anticipate. The reason is that the ruling could take several possible forms, with varying impacts upon the individual companies and locations of operation. It is reasonable to anticipate that the regulations will result in increases in costs of operation, such as might occur if European strains are outlawed, or if marking of each fish is required. This will put Maine firms at a disadvantage in the competitive world market.

There is legislation currently pending in the Maine state legislature proposing a USDA, Agriculture Research Service (ARS) facility at the University of Maine Orono campus with a field research station located on the coast. One of the primary functions of the facility would be to explore alternate species to diversify Maine's aquaculture industry.

Sources: Univ of ME "Impact of the Atlantic Salmon Industry on the Maine Economy" by J. Wilson, 1/11/00; Maine Aquaculture Innovation Center (<http://www.maineaquaculture.org>)

What are the US exports of affected animals or animal products?

US exports of salmon and salmon products are shown below, both total exports (world) and the top export destinations. Canada receives the vast majority of US exports of salmon and salmon products. Also shown are the percent (by dollar value) of US exports to the world that are shipped directly from Portland, Maine.

Country exported to	2000		
	quantity (kg)	\$ value (million)	% by value exported directly out of Maine
Trout (<i>Salmo trutta</i> , <i>Oncorhynchus mykiss</i> , <i>O. clarki</i> , <i>O. aguabonita</i> , <i>O. gilae</i> , <i>O. apache</i> , <i>O. chrysogaster</i>) fresh/chilled and frozen, excluding fillets, livers, and roes (0303210000 and 0302110090)			
World	795,054	2.71	0.8%
Canada	544,501	1.85	
Atlantic salmon (<i>Salmo salar</i>) and Danube salmon (<i>Hucho hucho</i>) excluding fillets, livers and roes, frozen (0303220000)			
World	149,714	0.65	10%
Canada	54,290	0.25	
Japan	41,825	0.17	
Atlantic salmon (<i>Salmo salar</i>) farmed, fresh or chilled, excluding fillets, livers and roes (0302120003)			
World	7,411,844	35.56	80%
Canada	7,085,501	33.47	
Atlantic salmon (<i>Salmo salar</i>), not farmed, fresh or chilled, excluding fillets, livers and roes (0302120004)			
World	59,440	0.3	1.3%
Canada	38,171	0.2	
Germany	20,650	0.1	
salmonidae, excluding fillets, livers and roes, fresh or chilled (0302190000, 0302120062)			
World	649,483	5.07	1.2%
Canada	500,145	4.11	
Processed salmon including not in oil and canned; whole or in pieces but not minced; and whole or in pieces but not minced and in oil and in airtight containers (1604114040, 1604114050, and 1604112000)			
World	5,818,879	25.2	<0.1%
Canada	3,323,837	16.63	
Smoked pacific salmon (<i>O. nerke</i> , <i>O. gorbuscha</i> , etc.) and atlantic salmon (<i>Salmo salar</i>) and Danube salmon (<i>Hucho hucho</i>), including fillets (0305410000)			
World	91,557	1.39	2.6%
Switzerland	19,996	0.45	
South Korea	20,588	0.23	
Canada	18,987	0.22	

Salmon roe, frozen dried, salted, or in brine (0305204020 and 0303804040)			
World	9,634,316	105	0%
Japan	8,472,886	97.41	
Trout (Salmo trutta, Oncorhynchus mykiss, O. clarki, O. aguabonita, O. gilae, O. apache, O. chrysogaster), live fish (0301910000)			
World	not available	0.19	0%
Canada	not available	0.19	

Source: World Trade Atlas

CEI's interpretation:

Since the 1999 identification of ISA in New Brunswick, Canada, in salmon pens only 3 miles from US pen sites, many believed it was just a matter of time before the ISA virus would be identified in US salmon. The identification of the virus in farmed Maine salmon has the potential to cause significant impact to the local Maine economy. The 1998 salmon production was almost \$60 million dollars and the personal income generated by the Maine salmon industry is estimated at \$140 million.

CEI's plans for follow up:

CEI has no plans for follow up on this issue, other than continuing to monitor the situation. If you seek more information or wish to comment on this worksheet, please reply to this message or contact Victoria Bridges at (970) 490-7822 or Ken Geter at (970) 490-7817.

Prepared by: Center for Emerging Issues, Centers for Epidemiology and Animal Health Animal and Plant Health Inspection Service, USDA