NOVA SCOTIA

AQUACULTURE
Frequently Asked Questions

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Are treatments applied to salmon a risk to human health?

No, they are not. That's because, by law, farmed fish cannot be treated with products in a manner that would make them unsafe for human consumption. To ensure fish health, the aquaculture industry is closely regulated. For example, if drugs are administered, they must not be harvested for food until after a specified withdrawal period to ensure they are safe for people to eat. Regulation and practices for farming fish are the same as those for all other farmed animals. Government Acts that apply are: the federal Feeds Act, the Food and Drugs Act and Regulations, Pest Control Products Act, Nova Scotia Veterinary Medical Act and the Nova Scotia Pharmacy Act. Food safety is closely monitored and strictly enforced by the Canadian Food Inspection Agency (CFIA) and the Nova Scotia Department of Fisheries and Aquaculture.

How are aquaculture farms monitored and managed for environmental impacts?

The Department of Fisheries and Aquaculture's Environmental Monitoring Program (EMP) is an important monitoring and regulatory tool employed by the department. It has been in place since 2002 and is one of the few marine aquaculture monitoring programs that samples both finfish and shellfish operations in a variety of marine ecosystems.

There are some 270 marine aquaculture sites along the coast of Nova Scotia. While all are monitored, larger or more intensive farms are given higher priority. Sites of potential concern are subjected to repeat sampling and, if necessary, remedial action as required. Using the latest sampling techniques, aquaculture lease sites and reference stations are monitored by gathering sea floor sediment samples, and through the use of underwater video.

The Environmental Monitoring Program focuses on the effects of aquaculture within bottom sediment rather than the water column because sediment samples provide a more accurate and consistent assessment of environmental change.

After many years of monitoring and analysis, the EMP has determined that the impact of aquaculture on the marine environment is generally low and that aquaculture in Nova Scotia is environmentally sustainable.

How do you get an aquaculture license or lease?

In Nova Scotia, aquaculture is closely regulated and monitored. At least eight provincial and federal agencies must review and provide input before a marine aquaculture site lease is issued. Proponents must submit an application and a detailed development plan that demonstrates that the plan warrants consideration based on environmental, economic and social conditions. Next, an ongoing technical review of the application is started by scientific staff (biologists and veterinarians) of the provincial Department of Fisheries and Aquaculture. Also, a digital geo-referenced map and site configuration sketches are required to show the infrastructure and equipment that will be placed on site as well as their location.

Applications are then typically reviewed by Transport Canada (Navigable Waters Protection Program); Fisheries and Oceans Canada; Environment Canada; and the Canadian Food Inspection Agency. Review and input are also provided by the provincial Departments of Natural Resources, Environment, Service Nova Scotia and Municipal Relations, Agriculture, and the Office of Aboriginal Affairs. Public engagement is an important part of the process. The office of Aboriginal Affairs works with our department and advises on applications that require official First Nation engagement. From start to finish, the application process generally takes approximately six months but depending on the complexity of the situation it may take between one and two years.

What enforcement and compliance takes place in aquaculture?

In Nova Scotia, the Department of Fisheries and Aquaculture has a staff of Fisheries Inspectors who are responsible for compliance with legislation and regulations that apply to the fishing and aquaculture industry. It is also their responsibility to address any complaints about aquaculture operations. They have the authority to mediate disputes where possible, issue warnings, enforce Ministerial Orders or, if necessary, lay charges against violators.

In addition to provincial enforcement, various federal government agencies play a role in monitoring and regulating aquaculture. The Canadian Food Inspection Agency (CFIA) regularly visits fish processing plants to ensure that aquaculture products meet government standards for safe, good quality seafood. The agency also oversees the in-plant Quality Management Program which ensures that aquaculture products conform to high international standards of quality. The Canadian Shellfish Sanitation Program involving the CFIA, Environment Canada, and Fisheries and Oceans Canada, monitors the health, production, processing and shipment of shellfish to ensure the safety and quality of Canadian shellfish.

Are aquaculture products grown sustainably?

Aquaculture products grown in Nova Scotia are produced sustainably. In fact, the industry cannot truly be successful unless sound ecological practices are used and resources are managed responsibly. At the Nova Scotia Department of Fisheries and Aquaculture and other provincial/federal agencies, personnel work to make certain that aquaculture sites are environmentally suitable, that, as much as possible, they do not conflict with other marine users, and that they provide benefits to coastal communities.

First and foremost, potential aquaculture farm sites must be determined to be environmentally suitable. A detailed site-specific assessment takes place by provincial and federal departments and includes a thorough review of potential impacts on fisheries and habitats.

Two important mapping projects (A Roadmap for Aquaculture Investment in Nova Scotia and a more detailed Constraint Mapping initiative) have recently been undertaken to determine suitability of sites for aquaculture in Nova Scotia. These projects will help identify areas best suited for aquaculture development based on bio-physical criteria, as well as history, experience and knowledge of local areas.

Existing marine farms are closely monitored through a government Environmental Monitoring Program (EMP) to ensure that they remain sustainable. There are currently more than 270 marine aquaculture sites

throughout a variety of coastal ecosystems around the province where a number of seafood species, including finfish and shellfish, are cultivated. All active sites are monitored under the EMP and larger, more intensive operations are given higher priority.

Economic suitability is also taken into account. Operators applying for new leases are asked to demonstrate the economic viability of the project and explain how it can create jobs and spin-off activity in local communities. Operators are encouraged to invest in communities as much as possible by hiring local workers, acquiring services/supplies in the community and, whenever possible, processing their seafood in the area.

Suitability within communities is also a factor. When determining farm locations, it is important to ensure that other uses of coastal resources are not significantly disrupted. Community engagement sessions are conducted by NSDFA to ensure that local citizens can comment and provide input about proposed sites directly to the department. Consultation with First Nation representatives is also part of the process.

In addition to the foregoing measures by government and industry, independent third party certification of aquaculture products takes place if industry chooses to seek such endorsements. Third party certifiers examine producer's practices to ensure that they comply with specific environmental standards before awarding their endorsement.

Is there a plan for development of the aquaculture industry in Nova Scotia?

Yes, there is a comprehensive approach to developing the aquaculture industry in Nova Scotia.

The Nova Scotia Department of Fisheries and Aquaculture recognizes the importance of having a provincial strategy and released the province's The Aquaculture Strategy, "Creating Sustainable Wealth in Rural and Coastal Nova Scotia" in May of 2012. This document emphasizes a sustainable aquaculture industry that respects the environment, provides jobs and economic benefits in coastal communities, and shares the coastal resource with traditional users.

Nova Scotia relies on the cooperation and collaboration between the federal and provincial governments to guide the development of this province's aquaculture industry. A Canada- Nova Scotia Memorandum of Understanding on aquaculture development serves to establish the roles and responsibilities of each level of government as represented by the provincial Department of Fisheries and Aquaculture and the federal department of Fisheries and Oceans Canada. Under this memorandum, Nova Scotia is identified as being the lead on licensing and leasing, site inspection and compliance, and fish health management. Both levels of government share in the responsibility for environmental management and development.

In the Atlantic region, NS, NB, PEI and NFLD are signatories to another Memorandum of Understanding for the development of the aquaculture sector. Representatives of the fisheries or aquaculture departments from each of the Atlantic Provinces meet throughout the year to plan and advance work on common priorities.

Nova Scotia helped to create and supports the implementation of the "National Aquaculture Strategic Action Plan Initiative" which contains a strategic vision for the development and management of sustainable aquaculture on a Canada wide basis.

Can aquaculture co-exist with the traditional fishery?

Yes, fishfarms can, and do, co-exist with the traditional harvest fishery. Aquaculturists and those in the traditional fishery work together to achieve common goals, while also improving the strength of Nova Scotia's coastal industries. In fact, a growing number of people are both aquaculturists and traditional fishers.

Co-existing with other marine users is imperative for aquaculture operators. One of the most important considerations when planning an aquaculture site is the impact it may have on traditional fisheries in the same area. The lease application process, which includes public input and engagement, focuses on ensuring that other marine interests are not significantly displaced or disrupted. Several agencies of both the Nova Scotia and federal governments are involved in the application process and subsequent monitoring of approved aquaculture sites. Ongoing environmental monitoring and enforcement by Inspection Officers helps to ensure that any interference with the marine environment is minimal and that aquaculture farms can co-exist with activities at wharf-side and in the water.

Aquaculture can benefit the marine environment in a number of ways. Globally about 50% of shellfish comes from aquaculture sources. In this way aquaculture supplies the growing world demand for seafood and takes some pressure off the wild harvesting sector to meet the total demand. Aquaculture also helps to enhance wild populations through natural spawning or through the purposeful release of cultured animals. A lobster hatchery in Pictou County now hatches lobsters for release into the Northumberland Strait to help replenish the lobster stock in that area.

Scientists agree that farming oysters and mussels contributes in a positive way to the local water quality and species diversity. Both of these animals filter food by siphoning water and eating the microscopic organisms. Farmed oysters and mussels can also have positive environmental impacts as local flora and fauna absorb the nutrients in the waste they produce. When aquaculture farms have positive environmental enhancements, it helps both seafood farming and the traditional fishery. Aquaculture is important in Nova Scotia because it is a sustainable industry that creates jobs and wealth in communities, shares the coastal resource, and respects the environment.

Why is Nova Scotia such a good place for aquaculture?

Aquaculture has great potential in Nova Scotia because we have the resources, infrastructure and experience to make fish and shellfish farming a flourishing industry. Our province has historically relied on the traditional fishery for major contributions to the economy and employment. Now, with the combined impact of traditional fish stocks declining and with demand for seafood products increasing, the aquaculture industry can help supply the world with seafood while also creating jobs and utilizing existing skills of fishery workers in our coastal communities.

The aquaculture industry has grown significantly over the past 30 years and, with increasing demand for seafood products, it will continue to grow. Aquaculture can provide full time jobs for people displaced in the traditional fishery and create new jobs for others who want to participate in fisheries.

Aquaculture also provides many indirect jobs and benefits for companies and individuals who provide services to the industry. This is a very wide field that includes veterinarians, scientists, lab technicians, divers, consultants, machine operators, and suppliers of fish cages, nets, rope, fish feed, fuel and accommodations.

Nova Scotians are accustomed to working in the marine environment and our fish processors have marketed fish to the world for generations. As the world's population continues to grow and more people become aware of the health benefits of eating seafood, the market for Nova Scotia aquaculture products will grow. Aquaculture, one of the fastest growing food-producing sector according to the UN Food and Agriculture Organization, now accounts for about 50% of the fish consumed in the world.

Our marine heritage, our history as a fishing industry province, and our extensive coastline make Nova Scotia a prime location for the growth and expansion of sustainable seafood farming.

How are concerns of property owners addressed?

The concerns of property owners are important to the Nova Scotia Department of Fisheries and Aquaculture and to those who practice aquaculture. Accordingly, the department encourages operators to establish and maintain good relationships with residents of communities near existing or proposed sites.

Aquaculture site applicants are encouraged to speak directly with local landowners before an application is submitted.

The Department itself also holds public meetings in communities near proposed sites so that the public and applicants can discuss projects, address concerns, provide information, and work to resolve conflicts.

The Navigable Waters Protection Program, a division of Transport Canada, requires that proposed aquaculture farms affecting navigation be publicly advertised and, in most cases, the Environmental Affairs division of Transport Canada conducts an Environmental Assessment of proposed projects which also allows for public input.

Once fish farms are established and operational, they are closely monitored and checked by government professionals to ensure compliance with applicable rules and regulations. Licences must be renewed every five years but can be cancelled by the Minister if a violation is serious enough.

Aquaculture is a legitimate and sustainable use of Nova Scotia's coastal waters but must be practiced with respect for the rights of property owners.

Does finfish farming impact the bottom of the ocean?

Fin fish farming can have some impact on the ocean bottom. However, because of the way aquaculture is conducted and monitored in Nova Scotia, this impact is typically limited and temporary.

On aquaculture lease sites, fish waste and excess feed can accumulate on the bottom beneath fish farm cages. Sites are chosen partially based on natural flushing provided by tides and currents in the site area. Good site management choices, plus a strong Environmental Monitoring Program (EMP), ensures that the impact of aquaculture is minimal. Operators are also encouraged to manage their fish farms in a responsible and sustainable way and to use fish feeding programs that meet the nutritional needs of fish while minimizing waste.

Since its inception in 2002, the EMP has shown that the temporary impact of aquaculture on lease sites is typically limited to areas within site boundaries and that sites can recover during "fallowing," which is a break between growing cycles. Fish farmers typically fallow sites after a production cycle to mitigate the potential for disease transmission to the next crop of fish and to allow the environment to rehabilitate. Fallowing is typically a voluntary measure for the farmer but if the site's environmental performance is not satisfactory, government can make this mandatory. Proper site management and close monitoring are both measures to ensure that aquaculture remains an environmentally sustainable industry in Nova Scotia.

How are lobsters and other marine life affected by treatments to salmon and trout?

Because the aquaculture industry is highly regulated by both federal and provincial government agencies, the risk to lobster and other marine life from treatments applied to farmed salmon and trout is minimal. Health and medicinal treatments of salmon or trout are tightly regulated under the federal Feeds Act, the Food and Drug Act and Regulations, the Pest Control Products Act, the Fisheries Act, the Nova Scotia Environment Act, the Nova Scotia Veterinary Medical Act and the Nova Scotia Pharmacy Act. The purpose of these acts is to safeguard the health of humans, marine life and the environment. Their application in the aquaculture industry is designed to minimize any potential risks to lobster or other marine life.

Does the amount of wild fish used in salmon feed compromise the ocean's food chain?

The simple answer to this question is no, it does not. There are several reasons for this.

First, fish used for salmon feed is from a sustainable and well managed fishery. It is made of by-products from the food processing industry, coupled with fish meal and oils from processing small pelagic species, such as anchovies, sardines, herring, capelin and Atlantic menhaden. Most of these species are not destined for the human food market.

Fishmeal and fish oil are created through a process of cooking, pressing, drying and milling small pelagic fish. Fish oil is primarily a product of the reduction process that creates fishmeal. For the past decade,

annual worldwide production of fishmeal has remained steady at about 5.5 to 6.5 million metric tonnes. Future prospects for the growth of this production remain small. Production of fish oil has been at a standstill in recent years and is not expected to increase.

As aquaculture production increases to meet the demand created by declining wild fish stocks, the cost of both fishmeal and fish oil will likely continue to increase. Primarily because of rising fishmeal and fish oil costs, farmed salmon and trout are being fed less of both. This, combined with improved feeding technology and feed management through feed conversion ratios (FCR's) has resulted in a reduction in the amount of wild fish required to produce an equivalent amount of farmed fish. Today's FCR's for farmed Atlantic salmon are typically in the range of 1.0-1.2., or 1.0 to 1.2 kg of feed to produce 1 kg of salmon.

Recent years have also seen a trend toward partial replacement of fishmeal and oil with alternate protein and lipid sources, such as flax, canola, soybeans and other animal fat sources such as poultry. This has met with a great deal of success and salmon producers currently use less than 20 per cent fish products in their salmon feed. This has reduced the fish-in/fish-out ratio to considerably less than one kg of wild fish to one kg of farmed fish.

Do farmed salmon spread disease or pests to wild fish?

Disease in wild fish populations is rarely documented, which makes it very difficult to determine the impact, if any, of diseased farmed fish should they escape and mingle with wild stock. Therefore, this is a difficult question to answer definitively because so little is known about existing diseases within wild stocks prior to establishment of an aquaculture operation. However, over the past 20 years none of more than a half dozen studies have found conclusive evidence that fish farming contributes to detectable adverse changes in wild fish populations.

The risk of infections in wild fish associated with escaped farmed fish depends on several factors, including an established presence of infectious diseases or parasites, how long the escaped fish survive, their behaviour in the wild, and the reduced potential to spread disease because of lower densities of wild fish. Research has shown that farmed fish in general do not survive very well in the wild. In Nova Scotia, the farming of finfish is closely regulated and monitored by several provincial and federal government agencies to ensure that the potential for fish escapes or disease transfer is minimal.

Do escaped salmon and trout pose a risk to wild populations?

In Nova Scotia, fish farmers take a proactive approach to reducing losses due to fish escapes for several reasons. They want to minimize any risk to the surrounding environment, and they want to minimize the potential for financial losses due to fish escapes.

Fish farmers and government regulators are always looking for new and improved ways to keep fish stocks contained. Accordingly, aquaculture sites are carefully located to limit exposure to storms that can damage fish cages, anchoring systems and nets. Sites are generally located close to islands and coastlines where there is shelter from storms. State of the art anchoring technology and improved site engineering have resulted in significant reductions in fish farm damage and fish escapes.

Nevertheless, some fish escapes can and do happen. Fish farms are monitored regularly, so detection of fish escapes is swift. Some people fear that escaped farmed salmon or trout may establish schools of farmed species in the wild which would compete with wild fish for habitat and food. Although the risks to wild fish populations are deemed to be low, research and studies are ongoing.

Fish farmers are well aware of the risk of diseases among fish, whether farmed or wild, so they take appropriate precautions to guard the health of fish stocks. If necessary, drugs or pesticides are used under close scrutiny by government agencies and provincial veterinarians to reduce the risk of loss to diseases or parasites.

And finally, it has been observed that, in terms of reproducing, wild fish generally do not interact very well with their farmed counterparts so there is little, if any, cross breeding. This is particularly true since farmed fish, in many cases, are all female.

What is the environmental impact of shellfish farming?

Although all human activities impact the environment in some way, shellfish farming can have effects that are both positive and negative. Environmental monitoring has shown that any negative effects of shellfish farming as practiced in Nova Scotia are localized, low risk and temporary.

There is a growing body of work that supports the potentially positive environmental aspects of farming shellfish, particularly bivalves such as oysters and mussels. For example, farming oysters and mussels can stimulate the growth of phytoplankton, algae and other plant life and can increase the abundance of deposit feeders, finfish and crustaceans.

Environmental monitoring of areas where mussels and oysters are farmed is a valuable tool to ensure that any negative impacts of bivalve culture on the surrounding environment do not exceed allowable levels. Research and studies have determined that any risks can be managed with good planning and mitigation measures through a responsible management approach.

Why isn't government promoting land based Aquaculture?

The provincial government does not prescribe any one form of aquaculture over another; instead, all types of sustainable fish farming technology and practices are encouraged. The Nova Scotia Department of Fisheries and Aquaculture licenses many hatcheries and several land based fish farms. Salmon and trout hatcheries in the province are strictly land based operations. High value, niche market species such as Atlantic halibut, Arctic char, and European sea bass, are raised successfully to market size at land based facilities.

There are three different ways to farm fish in Nova Scotia: open net pen, land based flow-through, and land based closed containment. The land based systems (both flow through and closed water

containment of varying degrees) employ a network of tanks and pumps that allow manipulation and control of water flow, quality, temperature, oxygen and filters. Filter components, heating and cooling systems, pumps and building infrastructure are major capital and operating expenditures compared with open net pen technology. There are also some environmental disadvantages, including the need for increased energy to run the systems and embodied energy in the construction materials for the buildings involved. Effluent from land based operations can be high in organic waste from the fish. Closed containment systems provide the safeguard of filtering fish waste, restoring water quality, and ensuring fish containment.

The open net pen system is widely used in aquaculture. Pens are buoyed on the surface of coastal waters and held in place with a system of moorings, lines and anchors. There are several advantages to the net pen systems; the natural marine environment provides both oxygen and water; fish waste is typically assimilated into the marine environment; and, the costs for equipment are considerably less than the cost of pumps, tanks and filtering systems used on land.

Closed containment technology for growing Atlantic salmon is not currently promoted by the provincial government because recent research has determined that it is not the most feasible, economical, or necessarily the most ecologically friendly method.

What involvement do First Nation people have in Aquaculture?

First Nation people in Nova Scotia may have been involved in some form of aquaculture as early as five thousand years ago. Archaeologists have found the remains of large fish weirs dating back to the Archaic period on Nova Scotia rivers. Late in the 16th century, the earliest reference to possible Mi'kmaq aquaculture is found in "The Voyage of the Ship Marigold unto Cape Briton and Beyond." In 1593, the Marigold's master, Captain Richard Strong, wrote of finding 'round ponds' in western Cape Breton. Aboriginals had made them to contain fish. Within those ponds, weirs had been made to harvest the fish. In the 17th century, there is evidence of "impounding weirs" that were similar in design to modern weirs.

In recent times, during the 1970s the Eskasoni Band became involved in a successful oyster farming project in the Bras d'Or Lakes. In the 1990s Eskasoni Fisheries and Wildlife developed a new means of retrieving oyster spat that were planted in high volumes in the Denys Basin near Malagawatch. In 1995 a fisheries co-op was formed by the Chapel Island Band to harvest and sell oysters on Canadian and international markets.

Currently, a number of First Nation groups are involved in aquaculture. At Millbrook, near Truro, they have developed a state-of-the-art land based facility to farm Arctic char. Waycobah First Nation re-activated

rainbow trout farming in the Bras d'Or Lakes at Whycocomagh. There are also a number of First Nation oyster licences/leaseholders throughout the Bras d'Or Lakes area. As this shows, some Nova Scotia Mi'kmaq have embraced modern aquaculture as a means of improving the economy of their communities while at the same time contributing to an increasing world demand for high quality seafood.

Although First Nation people participate in and benefit from aquaculture, they do not necessarily endorse all forms of fish farming. Some are active and supportive of salmon farming while others, express concerns about the impact of marine salmonid culture. On balance, though, the Mi'kmaq have been, and are, important contributors to the aquaculture industry.