Implications of aquaculture for wild fisheries: the case of Alaska wild salmon

Gunnar Knapp
Professor of Economics
University of Alaska Anchorage
Anchorage, Alaska, United States of America

ABSTRACT
Worldwide aquaculture production is growing rapidly. The experience of Alaska wild salmon suggests that aquaculture may have significant and wide-ranging potential implications for wild fisheries. Salmon farming exposed wild salmon’s natural monopoly to competition, expanding supply and driving down prices. Wild salmon has faced both inherent as well as self-inflicted challenges in competing with farmed salmon. The economic pressures caused by competition from farmed salmon have been painful and difficult for the wild salmon industry, fishermen and communities, but these pressures have contributed to changes that have helped make the salmon industry more economically viable. Farmed salmon has greatly expanded the market and created new market opportunities for wild salmon. Farmed salmon has benefited consumers by lowering prices, expanding supply, developing new products and improving quality of both farmed and wild salmon. Salmon farming has had no apparent direct effects on Alaska wild salmon resources, but could have indirect effects on wild salmon resources that might be positive or negative. The experience of Alaska wild salmon suggests that anyone interested in wild fisheries should pay close attention to what is happening in aquaculture. No wild fishery market – especially for higher-valued species – should be taken for granted.

INTRODUCTION
An aquaculture revolution is happening in the world seafood industry. Aquaculture accounts for an ever-growing share of world seafood production. One of the most important questions facing wild fisheries is how they will be affected by the development of aquaculture.

Salmon is one of the species for which the growth in aquaculture production has been most dramatic. Alaska is the world’s largest producer of wild salmon. Between 1980 and 2004, farmed salmon’s share of world salmon supply grew from 2 percent to 65 percent, and Alaska’s share fell from 42 percent to 15 percent. The experience of the Alaska wild salmon industry during this time provides insights into how aquaculture may affect wild fisheries.

A BRIEF OVERVIEW OF THE ALASKA WILD SALMON INDUSTRY
In recent years, Alaska salmon harvests have averaged about 350,000 tonnes (Figure 1). Over the past two decades harvests in most Alaska salmon fisheries have been very strong. Alaska wild salmon fisheries are certified as sustainable by the Marine Stewardship Council.
Five species of Pacific salmon are harvested in Alaska. Pink salmon accounts for the largest share of volume, followed by sockeye, chum, coho and chinook. Sockeye salmon – which commands much higher prices than pink or chum – accounts for the largest share of ex-vessel value.

Alaska wild salmon are processed into four major primary products, including frozen salmon, canned salmon, fresh salmon and salmon roe. These products are sold in markets all over the world (Figure 2). In recent decades, the most valuable markets have been the Japanese frozen salmon market (for sockeye salmon), the European and the United States canned salmon markets (for sockeye and pink salmon), the United States market for fresh and frozen salmon, and the Japanese market for salmon roe.

Alaska wild salmon are harvested in 26 gear and area-specific fisheries by small boats utilizing four major types of fishing gear (seine, drift gill net, set gill net and troll). Participation is restricted by a limited entry management system. About 20,000 fishermen work seasonally in Alaska salmon fishing. Alaska’s coastal communities are heavily dependent on salmon fishing for fishing and processing jobs and for tax revenues.

There is no salmon farming in Alaska. Salmon farming – and all finfish farming – is banned in Alaska. It was banned partly to protect wild salmon resources and partly to protect fishermen from economic competition from farmed salmon. ¹

For many or most Alaska salmon fishermen, salmon fishing is more than just a job. They love salmon fishing in part because it allows them the chance to work and live independently in remote places of great beauty. In the late 1980s, Alaska salmon fishermen enjoyed not only these benefits but also unprecedented higher prices and incomes.

**TEN LESSONS FROM THE EXPERIENCE OF ALASKA WILD SALMON**

I would like to suggest ten lessons from the experience of Alaska’s wild salmon industry about the implications of aquaculture for wild fisheries.

1. **Aquaculture can have rapid and dramatic negative effects on markets for wild fisheries**

   Competition from farmed salmon was the most important cause of a dramatic decline in Alaska salmon prices from the late 1980s to 2002. By 2002, real (inflation-adjusted).

   ¹ Although salmon farming is banned, Alaska does have a large-scale salmon hatchery programme. Hatchery releases account for about one-third of Alaska salmon harvests.
ex-vessel prices for most Alaska salmon species had fallen to about one-third of average prices during the 1980s (Figure 3). 2

For example, during the 1990s, farmed salmon rapidly replaced wild sockeye as the dominant product in the Japanese market. As the total supply of salmon to the Japanese market increased, the Japanese wholesale price of Alaska sockeye salmon declined dramatically (Figures 4 and 5). As the wholesale price in Japan declined, the price to the Alaska fisherman also declined.

2. Changes caused by competition from aquaculture may be painful and difficult for those who depend on wild fisheries

There were many difficult adjustments for Alaska fishermen as they experienced increasing competition from farmed salmon. As salmon prices declined, their incomes declined, as did the value of their boats and limited entry permits. Many fishermen lost their markets as declining profits resulted in the closing of many processing plants. Fishing communities experienced a loss in fishing taxes and population as processing plants closed and fishermen moved away, and through social stresses such as alcohol abuse. The political influence of the salmon fishing industry declined, and pressures grew to reallocate salmon from commercial fisheries to other uses such as sport fishing.

Many Alaska salmon fishermen blamed these problems upon competition from farmed salmon. They view farmed salmon as an inferior product that has harmed them. They believe that salmon farming in other places is harmful to the environment and unfairly subsidized. Car bumper

2 Farmed salmon was not the only cause of the decline in prices for wild Alaska salmon. Many other factors also contributed to the decline, including large Alaska salmon harvests, growing exports of Russian salmon, a recession in the Japanese economy and stagnant consumer demand for canned salmon.
stickers such as those shown in Figure 6 are commonly seen.

I think it is typical and natural for people who are suffering economic harm from competition to look for someone to blame – and to ask their government to help and protect them. However, when you are facing competition I think that the only real long-term solution is to understand better what your customers want and to work even harder to provide them what they want.

3. **In an increasingly globalized economy, the market effects of aquaculture on wild fisheries occur regardless of where the aquaculture is happening**

Alaska wild salmon are sold in global markets. The decline in Alaska sockeye salmon prices was caused by farmed salmon production in a foreign country for export to another foreign country (Chilean and Norwegian exports of farmed salmon and trout to Japan). Banning salmon farming in Alaska did not keep it from happening. Banning United States farmed salmon imports would not have kept it from happening.

4. **Wild fisheries may face significant inherent challenges in competing with aquaculture. These challenges derive from the fact that aquaculture producers have much greater control over production**

Inconsistent and unpredictable supply makes it much more difficult for wild salmon producers than for farmed salmon producers to meet buyers’ supply needs and to plan for marketing. Alaska wild salmon catches vary widely from year to year, and often vary widely from the preseason catch predictions (Figure 7). In contrast, salmon farmers know exactly how many fish they will have to process and to market – and who can choose when to process and market them.

The seasonality of wild salmon fisheries increases production costs relative to farmed salmon, and makes it relatively more difficult to market wild salmon (Figure 8). Sometimes so many salmon are harvested in a day that there is no practical processing option other than canning. There are not enough planes to fly the salmon to a fresh market, and there are not enough freezers to freeze them.

Wide variation in sizes and quality increases costs of processing and marketing wild salmon.
5. Competition with aquaculture exposes not only inherent but also “self-inflicted” challenges in wild fisheries

There are significant quality problems in many Alaska salmon fisheries resulting from practices at many different stages of fishing, tendering and processing. These include, for example, bruising that occurs as fish are removed from gillnets (Figure 9), poor handling as fishermen focus on working fast rather than handling fish carefully, long delivery times between when fish are caught and when they are processed, and lack of refrigeration or icing on fishing boats.

In some Alaska salmon fisheries there are many more boats fishing than are needed to catch the fish (Figure 10). Competition with aquaculture exposes these problems. When customers for Alaska salmon have alternative sources of supply, they are less willing to accept quality problems with Alaska wild salmon. When prices fall, it is harder to ignore how traditional ways of fishing add to costs.

6. Economic pressures caused by aquaculture may contribute to changes that make wild fisheries more economically viable

In the Alaska salmon industry, as fishermen and processors have left the industry, costs have fallen and efficiency has increased. Quality has improved in many fisheries. Marketing efforts have expanded. The salmon industry has worked harder to understand and meet the needs of customers.

7. Over the longer term, aquaculture may benefit markets for wild fisheries by expanding markets and creating new market niches for wild fisheries

As salmon farmers have expanded world supply of salmon, they have also greatly expanded world demand for salmon. Salmon farming has made salmon much more widely available.
Global Trade Conference on Aquaculture

available – in more countries and more stores, throughout the year. Salmon farming has created new salmon consumers and new product forms. Growing demand is creating growing niche market opportunities for high-quality wild salmon. Since 2002, strong demand has contributed to a rebound in prices for both farmed salmon and Alaska wild salmon (Figure 11).

8. Aquaculture benefits consumers by lowering prices, expanding supply, developing new products and improving quality of both farmed and wild fish

Since the development of salmon farming, both farmed and wild salmon have become cheaper and available more consistently, over a far larger geographic region, in more stores and restaurants and in more product forms (Figure 12).

9. Aquaculture may have both direct and indirect effects on wild fishery resources, which may be either positive or negative

The experience of Alaska wild salmon suggests that aquaculture may affect wild fishery resources in several different ways. Salmon farming critics have pointed out the potential for salmon farming to introduce diseases among wild salmon populations or for escaped salmon to introduce non-native salmon species or to affect wild salmon genetic diversity. However, because there is no salmon farming in Alaska, none of these direct effects have occurred in Alaska.

Aquaculture proponents have suggested that fish farming may benefit wild fishery resources by lowering prices and thus fishermen’s incentives to overexploit wild fishery resources. However, because Alaska salmon fisheries are well-managed, they are not over-exploited, and there is little evidence that lower prices have significantly reduced fishing catches or benefited salmon resources.

A potential indirect effect of competition from salmon farming is that lower salmon prices may reduce economic and political incentives to protect salmon resources and the environment on which they depend. When Alaska wild salmon were very valuable, there was a very strong commitment protecting salmon resources and the environment upon which salmon depend. But as the economic value of salmon has fallen, funding for salmon management and research has fallen, and there is greater support for proposed mining and oil development projects in salmon-producing regions.

10. The experience of Alaska wild salmon suggests that anyone interested in wild fisheries should pay close attention to what is happening in aquaculture. No wild fishery market – especially for higher-valued species – should be taken for granted

Aquaculture will continue to grow rapidly because it can meet market demands for
predictable, year-round and growing supply of high-quality seafood. The challenges to wild fisheries posed by aquaculture will increase over time.

**EFFECTS OF SALMON FARMING ON THE ALASKA SALMON INDUSTRY: TWO CONTRASTING PERSPECTIVES**

I will close by contrasting two different perspectives about how the Alaska wild salmon industry has been affected by salmon farming. The first perspective, which I call the “popular/green/Alaskan” perspective, is often reflected in the press and is commonly heard in Alaska:

Unfairly subsidized and inferior farmed salmon harmed the environment and wild stocks in producing nations, and flooded world markets, depressing wild salmon prices and significantly harming Alaska fishermen and fishing communities.

My own perspective, which I call the “economic perspective,” is different:

Salmon farming exposed a “natural” monopoly to competition, benefiting consumers by expanding availability, lowering prices, spurring innovation and market development, and leading to a more efficient wild salmon industry more focused on meeting market demands.

I do not mean to imply that competition from salmon farming has been easy for the Alaska salmon industry. It has not. It has been very difficult. But in the end, I think the Alaska salmon industry can and will change, survive and compete successfully in the very different world salmon market that salmon farming is creating – and will better serve the world’s consumers.