



FRASER RIVER SOCKEYE SALMON BENCHMARK STUDY

A Business Perspective on Fraser Sockeye

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Introduction

The Fraser River sockeye salmon fishery has long been a pillar of the BC seafood industry. In recent years, as Fraser sockeye commercial catch levels have declined and markets have shifted, the economic activity generated by harvest of Fraser sockeye has diminished. The infrastructure supported by Fraser River sockeye - seine, gillnet and troll fleets, processing companies, and service businesses - has withered as well.

As the stature and financial health of businesses reliant on Fraser River sockeye has deteriorated, the competitive environment facing seafood participants has grown increasingly difficult and complex. Globalization, the growth of aquaculture, a strengthening Canadian dollar, and skyrocketing energy costs are among the macro forces necessitating that BC seafood players conduct their business intelligently and effectively in order to survive and compete.

The Fraser River sockeye fishery is much-discussed and dissected from run-size, fishery management, and allocation perspectives. This discourse is often subjective and there is considerable friction amongst stakeholders. The business side of the fishery tends to be neglected, yet objective business analysis provides one path toward motivating stakeholders to work toward the common goal of maximizing the value of the available harvest.

This paper, commissioned by the Seafood Value Chain Roundtable, and prepared by Stuart Nelson of Nelson Bros Fisheries Ltd under the direction of the BC Seafood Alliance, examines the Fraser River sockeye fishery from a business perspective. The focus of this paper is to provide information and analysis to pave the way for improvements in business performance.

The Assignment

This report provides objective and quantitative analysis of the current and potential business performance of the Fraser River sockeye fishery. Among the activities and objectives of this project:

- Compare the Fraser River with benchmark sockeye fisheries in Alaska.
- Identify market requirements.
- Summarize current products and markets.
- Show how fish quality influences product form flexibility.
- Identify prices and production costs.
- Demonstrate how the quality/product/market mix affects financial returns.

- Demonstrate the business advantages of optimizing the product mix for fishery participants.
- Provide education for stakeholders.
- Recommendations.

A tenet of the Value Chain Roundtable, which commissioned this study, is that commercial fisheries should be managed to maximize value to stakeholders. While every Fraser River sockeye fishery stakeholder may hold a different view on how to “fix” their fishery, this paper strives to provide a business framework, a common denominator, for assessing opportunities for improvement to a currently under-achieving business.

Approach

There is no simple means of compiling financial information on the Fraser River sockeye fishery. In completing the study, a variety of information sources were tapped:

- Data on Fraser River run size, catch, and escapements (source: Pacific Salmon Commission).
- Financial data derived from interviews with industry participants and the author’s records: market prices, costs, yields.
- Market information derived from industry interviews.
- Fishery information derived from publications (DFO papers) and interviews with Fraser River sockeye fishery stakeholders.
- Reports on the seafood business in BC and in other jurisdictions.
- The knowledge and experience of the author.

From information gathered, a financial model was developed to describe and predict financial performance of the Fraser River sockeye fishery. The financial model, when fed with reasonable assumptions, is an objective tool for evaluating the effectiveness of various strategies and scenarios.

Not In This Paper...

A host of important issues have combined to impact the fishery and contributed to bringing it to its current diminished state. These include:

- Reduced Fraser sockeye abundance (ocean conditions).
- Increased in-river mortality for late-run stocks.
- Reduced in-river water flows, increased water temperatures.
- Illegal fishing.

- Habitat degradation.
- Shifting fishery management philosophy and practice (precautionary management, increasing escapement targets).
- Need to conserve stocks of concern (e.g. Cultus & Sakinaw sockeye, Interior Fraser coho).
- Requirement to adhere to Species at Risk Act.
- Allocation priorities between sectors (aboriginal, recreational, and commercial) and within the commercial sector (USA, Canadian seine, gillnet, and troll).

That some combination of these factors has resulted in a dramatic reduction in the scale of the Fraser River commercial sockeye fishery is indisputable. Whether fishery management responses to changing environmental, conservation, legal, and political conditions have been fitting is highly subjective, and outside the terms of reference of this study.

For the purposes of this study, it is sufficient to acknowledge that the constraints to mounting “industrial scale” commercial fisheries on Fraser sockeye runs have grown considerably in recent years. Less sockeye is available for commercial harvest now than in the past. To grow the business, stakeholders must maximize the value of available harvests, and find innovative strategies for increasing harvests within reasonable conservation and fishery management constraints.

Background

Before considering current and prospective Fraser River sockeye fishery information, it is prudent to provide a brief narrative of where the fishery has come from in the recent past, and where it stands today.

Where Has the Fraser River Sockeye Fishery Come From?

Until the mid-1990’s wild salmon was the dominant BC commercial fishery, and the Fraser River sockeye fishery was the pre-eminent salmon fishery on the coast. The financial performance of south coast fishing vessels, including seine, gillnet, and troll fleets, was strongly influenced by the size of the Fraser sockeye harvest and prices paid for the catch. Similarly, a sizeable processing sector relied on Fraser sockeye to underwrite volumes and revenues.

Beginning in the late 1980s, BC salmon participants saw declining values for pink and chum salmon, related to high catches in other jurisdictions and the market impacts of the growing salmon aquaculture industry. A lesser financial contribution from pinks and chums meant a greater reliance on sockeye - particularly Fraser River sockeye.

Through the 1990s changing ocean conditions resulted in dramatically lower harvest levels for pink and chum salmon in the north and central coasts. Lower volumes of pink and chum, coupled with lower per-pound values, made reliance on Fraser sockeye even more acute.

The 1994 fishing season typified the growing reliance of the salmon industry on the Fraser River sockeye fishery. An “Adams River” year-class meant strong returns. A heated market for BC sockeye in Japan (resulting from less-than-expected harvest in Alaska) meant strong ex-vessel and wholesale values. During the Fraser sockeye migration, opportunities for Fraser sockeye eclipsed any other coastwide salmon harvesting opportunities. Virtually the entire coastwide salmon fleet - seine, gillnet, and troll - honed-in on the approaches to the Fraser River.

Financial results were impressive: a 10-million piece catch of Fraser sockeye with an ex-vessel value of more than \$150 million¹, and a wholesale value exceeding \$250 million. The Fraser sockeye harvest likely accounted for at least one third of the entire value of BC seafood for the year.

Results were also sobering: the over-reliance of the industry on Fraser sockeye was never more apparent (what if the run had failed?) and the massive fishing pressure placed on the resource by the fleet left no margin for fishery management error. A post-season recap found that any further fishery openings during the 2004 season could have imperilled the Adams River sockeye cycle.

The 1994 fishing season demonstrated both the spectacular economic potential of the Fraser River sockeye fishery, and the unhealthy degree to which industry had grown dependent upon it.

The following seasons saw diminished access to coho and chinook (“coho crisis,” inter-sectoral allocations) for the commercial fleets, rendering Fraser sockeye dependency even more acute.

Where is the Fishery Now?

The most recent (2005) Fraser sockeye season saw a commercial harvest of 128,000 fish with an estimated ex-vessel value of about \$1.5 million and a wholesale value in the \$2.5 million range. The economic scale of the 2005 fishery was about 1/100th of that seen in 1994. Admittedly, this comparison pits record-highs against (near) record lows, but it effectively demonstrates the diminution in the fishery over the last decade. The adjacent table shows average annual run sizes, escapements, and Canadian

Period	Fraser Run Size	Escapement	Cdn Comm. Catch
1990-97	13,314,405	4,514,305	7,046,191
1998-05	7,468,473	5,843,335	874,413

¹ Data from BC Salmon Marketing Council database (1994 catch value by area)

commercial catches for the past two-cycle periods.

Given that the BC fishing industry was over-reliant on the Fraser River sockeye fishery in the 1990's, and that the fishery has declined so precipitously, it should not be surprising that stakeholders have undergone dramatic economic and social adjustments in the ensuing years.

The number of salmon fishing vessels has been more than halved through fleet rationalization mechanisms (government funded buyback, licence stacking), and a number of processors have exited the business. Remaining fishermen and processing companies have necessarily reduced costs and diversified into other fisheries and activities.

Today, the Fraser River sockeye fishery is largely an opportunistic activity for stakeholders; they do not rely on it, and do not build it into their annual business plans. New investment in the fishery has not been justified, in fact there has been significant dis-investment. Any remaining infrastructure is in place to exploit other fishery opportunities (other BC salmon, Alaskan salmon, or other species).

How Did We Get Here?

As stated earlier, the purpose of this paper is not to assign blame for circumstances in the Fraser River sockeye fishery, but rather to promote improvements in the business performance of the fishery. From a business perspective, the plight of the Fraser River sockeye fishery could be attributed to the following:

- Dramatically reduced harvest levels.
- Inconsistent harvests - hit and miss, little notice, short duration.
- Shifting markets, declining prices.
- Inability to meet customer needs, displacement from key markets.
- Competitive developments (growth of aquaculture, globalization, increased operating costs).

Essentially, stakeholders in the Fraser River sockeye have been sidelined at a time when global competitors have been extremely active. The business has grown more challenging and competitive, at the same time as Fraser River stakeholders have been shedding infrastructure, seeking alternative sources of income, and squabbling amongst themselves over catch shares and levels.

For a now-small (and fractured) industry to compete in an increasingly global marketplace, application of sound business principles is required.

Competitive Developments in the Seafood Industry

The competitive environment facing not just sockeye salmon producers, but wild salmon and other capture-fishery seafood participants worldwide, has grown increasingly challenging in recent years.

Developments

- **Growth of aquaculture** - the impacts of aquaculture on wild seafood producers are profound. Aquaculture offers consumers large volumes, consistent availability of high-quality fresh product, and low price levels. Farmed products displace wild ones, and offer a growing number of alternatives to traditional products (e.g. basa, tilapia, catfish). Aquaculture producers enjoy distinct advantages over capture fishery producers, as they do not face the inherent uncertainties associated with resource abundance and catch levels. Aquaculture is, to say the least, a formidable competitor for the capture-fishery sector. Ignoring (or opposing) aquaculture does nothing to mitigate its effects on the wild seafood business.
- **Growth in wild salmon production** - North Pacific salmon production is at historic highs, despite low production from BC. Volumes from Alaska, Japan, and Russia are at lofty levels. When record wild salmon volumes hit the market along with massive farmed production, the resulting over-supply of salmon can only place downward pressure on prices.
- **Decline in the Japanese market** for wild seafood - Japan was traditionally the largest and most lucrative outlet for wild fishery production. However, the weakening of the Japanese economy and currency, a growing acceptance of farmed product as a substitute for wild, and changing demographics and consumption patterns (westernization of diet) has reduced the lustre of this market. Producers have been forced to develop markets elsewhere, often for lower prices.
- **Globalization of the seafood industry** - once a parochial industry where access to resources brought processing/market clout, the seafood industry now features raw material and finished product shipped around the globe, with little relationship between site of harvest, location of processing, or point of sale. Twice-frozen seafood has gained (unwitting) consumer acceptance, so fish can be frozen near the location of capture, shipped to China, thawed for re-processing, re-frozen, shipped to market (anywhere in the

world) and re-thawed for sale to consumers. China has become a low-cost, high-quality processing centre. The Internet makes fishery and market information instantly available to everyone. Seafood is an increasingly mobile commodity. Competition in the seafood industry comes not just from the operator across the bay, but from countless unseen operations around the world.

- **Consolidation of seafood distributors** - as the number of seafood distributors has shrunk substantially in recent years, the size and influence of those remaining has grown. Major seafood distributors/retailers possess a great deal of buying and market power, which they wield to negotiate preferential purchase terms from suppliers. High quality, low price, and consistent availability are *givens* in today's wholesale/retail environment.
- **Sustainable fisheries** - consumers are increasingly concerned about the health of oceans and marine resources, and this awareness is reflected in a growing movement to certify the sustainability of capture fisheries. The Marine Stewardship Council (MSC) is the pre-eminent organization providing the "seal of sustainability". Seafood distributors/retailers are increasingly embracing this movement, with a host having declared that all seafood purchases will be from certified sustainable fisheries within a prescribed time period. Wild fisheries ignoring this trend will imperil the marketability of their products.
- **Consumer inclination toward "wild" seafood** - in some markets, particularly North America and Europe, there has been a backlash of sorts against aquaculture, specifically farmed salmon. Wild seafood has been granted a window to regain at least a portion of lost market share.
- **Health and safety standards** - always rigorous, the "bar" for seafood meeting the health and safety standards of key markets is ever-rising. Seafood destined for export must be produced according to stringent protocols and finished product must meet high standards. An additional burden on producers, called "traceability", requires documenting precisely how/when seafood is handled through the chain of custody, including harvest, processing, transport, and warehousing. It is no longer enough to produce high-quality seafood; a costly documentation-trail describing the production process in fine detail must also be produced.
- **Currency exchange rates** - with seafood traded liberally around the world, producers are greatly affected by fluctuating currency exchange rates. Canadian dollar strength relative to the yen and U.S. dollar has meant a sharp decline in prices realized for exports of Canadian seafood products.

- **Rising energy costs** - as the cost of crude oil and diesel fuel has escalated in the last couple of years, the cost of fishing has risen, too.

These are just some of the developments seen in the global seafood industry in recent years having an impact on seafood businesses.

Many of these factors were non-factors when the Fraser River sockeye salmon fishery was last operating at full-scale. Fraser sockeye participants who have been “side-lined” in recent years may be unaware of the extent of change in the seafood business in the last few years.

Impacts on Participants

Increasing Business Complexity

It is obvious that the developments cited above contribute to an increasingly complex business environment for today’s wild seafood businesses:

- Aquaculture’s impacts are everywhere, and new species are coming all the time.
- There is always lots of fish on the market (even if little of it is ours).
- Markets are ever-changing.
- Globalization means that the competition is everywhere.
- Consumers’ shifting attitudes toward wild seafood brings challenges and opportunities.
- A consolidated distribution sector can impose its will.
- There is a tremendous amount of information to assimilate.
- The cost of fishing is rising as crude oil prices spiral.
- Challenges emerge from all directions: competitors, technology, environmental groups, customers, the public, and government(s).
- All of this in addition to the inherent variability of the wild seafood sector... it has always been a challenging business.

Collectively, these complications divert time, energy, and financial resources from the core task of catching, processing, and selling fish. They confound the path to business success. They make participants long for the “good old days.”

Margin Squeeze

The financial effect of competitive developments in the seafood industry is simple to describe: downward pressure on revenues, upward pressure on costs, resulting in lower margins.

With profitability in the seafood industry never having been stellar, diminished margins are not tenable.

This suggests that, to succeed in the modern seafood business environment, adaptation is required. The “old ways” are unlikely to bring required results in the modern era.

Resistance to Change

Fraser River sockeye participants are like seafood participants the world-over, they are reluctant to change when they realize that *external developments* are causing upset to their business. *Why should we change when it's not our fault?*

For Fraser River stakeholders, the most obvious change they have observed is a drastic reduction in harvest levels and precious-little fishing activity in the last eight years. It is understandable that they focus on harvest volumes, and believe (hope?) that restored volumes will bring acceptable financial results.

Fraser River sockeye salmon participants often envy their counterparts in Alaska, where runs of all species of salmon are healthy, catches are strong, and fisheries management is touted as “world class.”

Benchmark Sockeye Fisheries - Alaska

Alaskan sockeye fisheries represent the largest supply of sockeye salmon in the world. Despite strong stocks, however, Alaska's sockeye fishery participants have experienced business challenges, and developed strategic responses, that may be instructive to commercial Fraser River sockeye stakeholders. Following are snapshots of three key Alaskan sockeye fisheries: Copper River, Chignik, and Bristol Bay. In each of these benchmark fisheries, the problems, processes leading to change, and results, are highly involved and complex. The details are necessarily glossed-over in this brief analysis.

Copper River

Situation

Copper River is a gillnet sockeye fishery in the Prince William Sound area of Alaska's Central Region. The average annual harvest is around 1.5 million sockeye. The timing of the Copper River sockeye run is unusually early. Typically, early-season fisheries suffer from high operating costs, as assets do not reach full utilization. In the 1980's, a group of gillnetters recognized that timing of the Copper River sockeye run presented a potential marketing angle - “first sockeye of the season” - and that a marketing edge might offset these cost disadvantages.

Response

The Copper River Fishermen's Coop established a brand name for the region's fish, and began an education and training program to instill a quality fish-handling ethic amongst harvesters. The initiative attracted considerable fishermen-support and a sizeable marketing budget.

Results

Copper River is now a widely recognized brand name (for which there is a patent pending). Thanks to clever regional marketing, North American consumers now equate "Copper River" with "premium quality." When the first fresh Copper River sockeye hits the market each spring, restaurants and retailers actively promote the product, and customers pay premium prices. The early portion of the harvest is typically air-freighted around the globe. The Copper River quality and marketing campaign establishes a high-value niche for sockeye salmon, a consumer awareness that can benefit sockeye from other fisheries as well.

The marketing frenzy accompanying the "first sockeye of the season" translates into attractive prices for harvesters - for the first portion of the catch. The market size for "designer-priced" sockeye is finite, however, and as the season wears on and harvest volumes grow, prices return closer to commodity levels.

The Copper River branding initiative is evidence of the potential of marketing to develop awareness, differentiate products, and shape consumer perception. Copper River sockeye is often regarded as the best sockeye on the market, even though its attributes are no different than those of many other sockeye stocks. Copper River also illustrates the limitations of marketing - high-priced market niches are extremely finite, no matter how glossy or active the promotion.

Chignik²

Situation

Chignik is a 100-vessel seine fishery, also in Alaska's Central Region. Sockeye is the pre-dominant specie, with annual harvest averaging 1.5 million fish. Weakening markets for Alaskan sockeye caused ex-vessel fish prices to decline through the 1990's. The industry recognized that strategies to improve revenues while reducing cost were necessary to ensure continued business viability.

Response

A majority of harvesters believed that a competitive fishery was working counter to the objectives of improving revenues and reducing cost. In 2002, a Cooperative was formed, with

² information substantially drawn from "Selected Effects of the Chignik Salmon Cooperative," Gunnar Knapp, November, 2004

participation optional - fishermen could participate in the Co-op, or remain in a competitive fishery. Seventy of 100 vessels joined the coop. The harvest was divided pro-rata between the Co-op and the competitive fishery.

Results

Under the Co-op, the number of vessels actively fishing has been dramatically reduced: about 20 vessels have harvested on behalf of 70, with revenues and expenses shared amongst all Co-op members. The fishery has been spread out evenly over the period of the sockeye migration.

The Co-op has resulted in a number of positives from an economic perspective:

- A substantial reduction in fishing costs - fewer vessels fishing means lower total expenses.
- Improved handling practices, including live harvest and haul of fish to the plant.
- Fine-tuned daily harvests based on market requirements (and in conjunction with fishery management).
- A higher portion of the catch sold to the fresh market.
- Higher ex-vessel fish prices.

While the Co-op fishery has allowed for improvements vs. the status quo, it has not been the salvation of the Chignik fishery, since both sockeye returns and market conditions have been weak since the Co-op's inception.

Also, business improvements have been accompanied by other effects:

- Reduction in fishing employment (fewer boats actively fishing means fewer crew jobs).
- Shift in processing - from two major processors to one.
- Strong opposition to the Co-op, on philosophical and legal grounds. In February 2006, the Supreme Court of Alaska said that the Board of Fisheries did not have the authority to establish the Chignik Co-op under the Limited Entry Act. It is not yet clear whether there is the political will to change the Act to permit Chignik and other co-ops.

The Chignik experience highlights the merits of restructuring a fishery and a fleet according to revenue and cost considerations, but also illuminates that fundamental change can bring dislocation and vehement opposition.

Bristol Bay

Situation

Bristol Bay is truly the world's "benchmark" sockeye fishery. It is the largest sockeye fishery, with annual catches averaging 25 million fish, and the fishery that, through sheer volume, sets the sockeye market trend.

This is not to say that Bristol Bay is a leader in quality or innovation. A competitive fishery featuring high catch volumes in a brief timeframe, producers are more motivated by volume than by quality. The key determinant of Bristol Bay's product mix has been shelf-stabilizing massive amounts of product in the shortest amount of time. The bulk of the region's sockeye was historically frozen for sale to Japan in headed and gutted (h&g) form. A minority of production was canned, mostly into "talls" (one-pound cans). Declining Japanese demand has resulted in declining prices and limited marketability for h&g product. Deteriorating markets have resulted in declining catch and wholesale values, and caused severe friction in the industry (including a class-action price-fixing lawsuit brought against processors by fishermen).

Response

Collectively, Bristol Bay sockeye producers have shifted their production emphasis from frozen to canned, and within the canned category, from "talls" to ½ and ¼ pound production. This has required significant investment in plant and machinery, and penetration of non-traditional markets.

Results

The product-shift executed by the Bristol Bay industry has:

- reduced Bristol Bay's reliance on the Japanese market.
- displaced Canadian salmon producers from the ½ pound market (long their domain).
- gained Bristol Bay a strong position in the ¼ pound market (also formerly dominated by Canadian producers).

By executing a product-shift, Bristol Bay sockeye producers have preserved the marketability of their production, and values have risen slightly from the lows seen in the mid-1990's. They have diversified their product mix, and gained market share at the expense of competitors.

But Bristol Bay's inroads into the ½ and ¼ pound markets have been gained mostly through *pricing*. With a lower cost base than any competitor, Bristol Bay canners have been able to undercut the prices charged by their Canadian counterparts. By paying relatively low ex-vessel fish prices, and through economies of scale accompanying high production levels, Bristol Bay producers

enjoy a competitive advantage over producers of similar product forms.

Alaska Case Studies – Applicability to Fraser River

The purpose of examining other jurisdictions is to gain perspectives pertinent to the task at hand: improving the business performance of the Fraser River sockeye fishery.

No Role Models...

Unfortunately, none of the Alaskan sockeye fisheries - Copper River, Chignik, or Bristol Bay - comprise a role model for the Fraser River. There is no simple recipe for success. Each fishery is unique, with different challenges and a different group of stakeholders. In each fishery certain business shortcomings have been recognized and addressed, but each still faces considerable further work to realize its full potential.

Lessons for the Fraser River

Alaskan Fishery	Positives	Cautions
Copper River	Regional marketing can work - a brand image/product differentiation for "Copper River." Marketing program can bring premium wholesale values and fish prices. Industry working together to fulfill quality expectations.	High-value niche markets have limitations... early volumes earn premiums, later catches earn "commodity" price. Marketing program requires significant expenditures.
Chignik	Fishery reform to lay the foundation for business improvements: lower costs, improved quality, better service to markets, higher values. Innovation and investment flows from rationalized business. "Holistic approach" to addressing business challenges.	Addressing business issues does not bring "immunity" from resource and market conditions. Implementation of reform without due process: buy-in of entire industry, legal issues.
Bristol Bay	Shifting product emphasis to ensure marketability of product. Exploiting competitive advantage: low cost through high volume (economies of scale).	Failure to address the value side of the equation: intense competitive fishery with incentives to maximize volume, not value.

High Catch Levels Do Not Assure Success

Three Alaskan sockeye fisheries with adequate harvest levels, all facing business crises related to markets and costs... this should prove instructive to Fraser River stakeholders who believe that if their fishery was restored to its former size then all economic problems would vanish.

Clearly, catch levels alone are not enough to ensure business success in the modern sockeye salmon fishery. Indeed, high catch volumes can expose and exacerbate fundamental business weaknesses.

Healthy catches may even obscure the fact that business shortcomings exist - many Alaskan participants cling to the notion that, because their sockeye stocks are healthy, any business problems are either transitory, are someone else's fault, or can be remedied by band-aid solutions. The case studies demonstrate that Alaskan sockeye fishery participants have not fully embraced the need for fundamental change.

Consistent Catches are a Pre-requisite of Success

While the sizeable annual Copper River, Chignik, and Bristol Bay sockeye catches do not guarantee success for stakeholders, they provide a critical foundation for business development. Marketing programs, fishery reform, and productivity investments are futile without a solid production base underlying them.

Like their Alaskan counterparts, many Fraser River sockeye stakeholders fail to recognize the impact that shifting competitive conditions are having on their business, in part because the absence of a meaningful fishery means they do not *have* a functional business.

Fraser sockeye participants are effectively starting from "ground zero," building a sockeye business from scratch. Ironically, this may provide them with an advantage over the Alaskan industry, in that holistic - not piecemeal - approaches must be adopted.

Fraser Sockeye Revenue and Cost Considerations

The need for fundamental change in the Fraser River sockeye business has been intimated repeatedly in this paper. The fact that seafood participants world-wide face a margin squeeze - downward pressure on revenues, upward pressure on costs - has been asserted.

The financial formula for improving financial performance is simple: improve revenues and lower costs. In this section, information specifically relating to Fraser River sockeye revenues and costs is provided.

Sockeye Market Developments

A couple of four-year sockeye cycles ago, the market picture for Fraser sockeye salmon could be generally described as follows:

- Fraser River the 2nd largest sockeye producing river system in the world; a factor in the scheme of world sockeye supply.
- About half of Fraser sockeye canned into ¼ and ½ pound can-sizes, primarily for the Canadian and United Kingdom markets; a combination of branded product (eg Cloverleaf, Gold Seal, Ocean's) and private-label product. Domestic market product generally sourced from BC sockeye fisheries.
- A sizeable minority of production frozen in headed and gutted (h&g) form for export to Japan. A buoyant Japanese economy (a bubble economy, unfortunately) and a strong affinity for sockeye made for a highly attractive market.
- A very small amount of production allocated to other product forms and markets (eg. smoked).
- The size of the Bristol Bay harvest was the primary determinant of both canned and frozen market price levels. The majority of Bristol Bay production went in h&g form to Japan. A minority was canned, mostly into "talls." A large Bristol Bay pack meant long supply and downward pressure on prices. A short Bristol Bay pack meant upward price pressure.

The current market picture for Fraser sockeye is substantially different:

- **Japan** - the economy has softened, with a dampening effect on price levels. Farmed salmon, particularly coho from Chile, has become accepted as an affordable red-fleshed salmon. While sockeye is still an important specie in the Japanese market, imports from Russia have increased. The stature of Bristol Bay in the Japanese market has declined. The Fraser River has virtually lost its position in the market. The demand - in terms of volume and price level - for sockeye has declined. The attractiveness of the Japanese sockeye market has lessened substantially.
- **Canned Market** - as noted earlier, Bristol Bay has shifted a portion of its production to canned salmon, with ½ and ¼ pound sizes added to the traditional "tall" line. Alaska now substantially "owns" the ½ pound market, long the foundation of the BC canning industry. Price levels for ½'s are far lower now than in the past. Quarter-pound canned salmon is still an attractive market, in which BC producers can compete. BC producers import canned sockeye from Alaska to meet their branded and private label needs. Contrary to popular belief, the canned salmon market is not shrinking, its size has remained remarkably constant. One

market segment that is vanishing is that for “standard grade” canned salmon. The lowest quality grade for canned salmon, “standards” meet health and safety standards, but offer marginal aesthetics, texture, and flavour. Retailers are no longer willing to offer product that often disappoints customers.

- **North American market (primarily USA)** - virtually non-existent a few years ago, a market for sockeye salmon has emerged and is being developed steadily (mostly by Alaskan producers). Sockeye salmon enjoys substantial recognition in the US market, thanks in part to marketing efforts by the Copper River region, and occupies a “premium” market position. That is, sockeye commands a higher price than farmed salmon and wild salmon such as pinks and chums. However, North American consumers, conditioned by the farmed salmon industry to expect consistently high quality, demand that sockeye’s quality is commensurate with its premium price level. Favoured product forms are fresh or frozen portions. The growth in the North American sockeye market to-date is far less than the diminution suffered in the Japanese market. North America is a market to be nurtured and grown over time.
- **Niche Markets** - with the marked reduction in the size of the Fraser sockeye fishery in recent years, participants have had only scant production. This has afforded the opportunity to open-up new local distribution channels. Some harvesters have had success “direct marketing” their harvest to the public (via public sales floats, the internet, or simply door-to-door) or to restaurants. First Nations have enjoyed small successes with sale of traditional products. The success of these activities has emboldened many harvesters, though the scale of this commerce has been very small. Typically, niche markets are quickly filled as fish volume grows (even a well-marketed scheme like Copper River). However, a new sector of small-scale entrepreneurs is now a component of the Fraser River sockeye salmon marketing framework.

This is essentially the market picture now facing Fraser River sockeye salmon fishery participants: the challenges of competing in large-scale commodity canned and frozen markets, opportunities to service a growing North American fresh/frozen market, and the realities of translating micro-marketing success into larger scale enterprise.

For Fraser sockeye stakeholders to improve the revenue side of the profitability equation, they must understand the ever-changing market picture, and embrace a market-driven business philosophy: offering customers what they want.

What do Sockeye Customers Want?

Today's consumers enjoy a wide range of choices when pondering their next salmon purchase. The ready availability of farmed salmon - Atlantic, coho, and steelhead - has conditioned consumers to consistency, quality, and freshness at reasonable cost. Pink and chum salmon, always abundant from Alaskan, Japanese, or Russian fisheries if not from BC, offer wild salmon alternatives at budget prices.

There is also a strong market segment for sockeye - as a high quality, red-fleshed wild salmon - in both fresh/frozen and canned form. To be marketed as a premium wild salmon and command premium prices, however, sockeye salmon must meet lofty customer expectations.

Premium Attributes

Salmon customers equate "red" with "quality," so vivid flesh colour is a vital attribute. Other "premium" attributes associated with top-quality sockeye salmon are firm flesh texture, bright skin colour, and high oil/fat content.

Consumers purchasing lesser quality sockeye (at premium prices) will be disappointed, reducing the chances of re-purchase, motivating them to purchase a lower-priced salmon, or causing them to abandon the salmon category altogether.

A Wild Alternative

As mentioned, seafood consumers have been "spoiled" by farmed salmon in terms of the consistency of the product: always available, always fresh, always the same size, colour, and flavour. By providing customers with consistent value, farmed salmon first displaced wild salmon on many seafood shelves around the world, and then expanded the market category substantially.

In the last couple of years, however, there has been a consumer backlash against farmed salmon: not because of customer dissatisfaction with the product itself, but because of highly publicized environmental impacts related to the rearing of the animals and concerns about additives in the feed. While some consumers remain loyal to farmed salmon, others have turned-off it completely, and others are increasingly amenable to wild salmon alternatives. This backlash has provided a real opportunity for wild salmon to regain profile in an expanded market category.

The emerging consumer preference for wild salmon, however, is not a *carte blanche* for producers to sell poor quality and/or over-priced product to the marketplace. For wild salmon to gain an enduring position alongside (or as a replacement to) farmed salmon, producers must provide consumers with consistent strong value. While wild salmon fisheries cannot provide year-

round fresh product, once (or even twice) frozen product can be entirely satisfactory, providing the fish is well handled from capture through presentation to the consumer.

For sockeye salmon to maintain and grow its market position, customers must be consistently provided with a premium quality, red-fleshed salmon.

About Fraser Sockeye Quality

It seems logical that to command a premium price in a marketplace loaded with salmon alternatives, sockeye salmon must meet strict quality standards and possess strong product attributes. But how is the Fraser River fishery positioned to meet customer expectations?

The intrinsic quality of Fraser sockeye is superb - more than adequate to meet market standards. Knowledgeable seafood buyers around the world prize Fraser sockeye's red flesh, high oil and fat content, and bright hue.

The large in-river distance traversed by most Fraser sockeye stocks in order to reach their spawning grounds implies a firm, fat, robust fish as it completes the ocean portion of its migration and braces for the fresh-water passage.

Physiological Changes During Migration




During the Fraser sockeye's journey up-river, however, the attributes of the fish change. No longer feeding, and battling against the rivers' flows, sockeye are fuelled by built-up stores of energy (fat, oil, muscle). Skin thickens, and colour changes from bright blue-silver, to duller shades of red-grey. Fish lose body weight, and re-productive organs comprise a growing portion of the sockeye's mass. Some of the red pigment in the flesh is transferred to the skin and the eggs, making the flesh paler. As muscle is spent, and energy consumed, flesh becomes softer, and belly-walls thinner. Sockeye arrive at the spawning grounds substantially spent.

Fish Attributes Impact Marketability

These physiological changes occur progressively throughout the migration, and the rate and extent of metamorphosis varies from fish-to-fish. As the physical transformation of sockeye occurs, the attributes of the sockeye from a marketability perspective change, too.

The location of capture, therefore, has a bearing on the marketability and value of the fish from a commercial perspective. The following table provides a comparison of a

Fraser sockeye's appearance and market/product attributes as it progresses through its migration³.

Capture Location/ Attributes	Ocean	Estuary (e.g. Area 29)	Terminal (arrival on spawning grounds)
External Appearance (skin colouration):			
Marketability:	Intrinsic fish attributes do not constrain its use. Can be used for highest value products and markets.	Intrinsic fish attributes pose some constraints on use. Not suitable for some products and markets.	Intrinsic fish attributes pose serious constraints on use. Not suitable for most "conventional" products and markets. Some specimens may not be marketable.
Skin colour:	Silver side with blue-green sheen	Loss of dividing line between dorsal and ventral	May show distinct red blush
Belly wall thickness:	Consistent with species	Thinner than ocean-caught	May be very thin
Flesh colour:	Red	Red	May be lighter red (or marbled)
Oil content:	Highest	Less oil content than ocean-caught	Least oil content
Flesh Texture:	Firm	Less firm	May be soft

It is evident that as sockeye proceed through their migration, they possess fewer of the attributes that are prized by the marketplace. Reduced market attractiveness implies a lower commercial value. It follows that a harvest-mix as heavily weighted to ocean-caught Fraser sockeye as possible offers the best prospects for "giving customers what they want."

Fraser Sockeye – Capture Location Trend

As the size of Fraser River sockeye salmon harvests has diminished, the location of the fishery has moved further inland. The ratio of ocean-caught sockeye is lower now than in the past.

The reasons for the shift from ocean to in-river harvest are well chronicled, and include precautionary management (reluctance to mount major commercial fisheries until run-sizes can be accurately estimated), increasingly precise discrete-stock management (minimizing mixed-stock fisheries), the need to protect weak stocks (e.g. Cultus Lake), and assuring the First Nations throughout the Fraser watershed are provided adequate access to sockeye.

³ information substantially from the BC Salmon Marketing Council's "Canadian Sockeye Salmon Skin Color Guide" and "Characteristics of Sexual Maturity" table.

The effect of the shift to increasing fresh-water harvest of Fraser sockeye is to diminish the market options for the catch. Typically, when the volume of a fishery is curtailed, participants are encouraged or motivated to focus on boosting the value of the remaining catch. Fraser participants are in the difficult position of dealing with both reduced harvests, and a less-desirable catch mix... a formidable “double whammy.”

Fraser River stakeholders striving to address the revenue side of the profitability equation are thus faced with a daunting challenge.

Fisheries Management Impact on Revenues and Costs

The traditional thinking, when roles in the salmon fishery are considered, is that government’s job is to manage the fishery, and industry’s job is to manage its business affairs (deal with revenues and costs). This simplistic thinking ignores the reality that fishery management has a tremendous impact on the business side of a fishery.

How Fisheries Management Affects Revenues and Cost

In a presentation to the BC Seafood Alliance Seafood Summit⁴ (November, 2005), noted University of Alaska fisheries economist Gunnar Knapp made a presentation on this theme. The following points are excerpted from this illuminating presentation:

“Fisheries management directly affects prices and costs at all levels of the seafood industry in many ways:

- *by affecting when fish are harvested and processed*
- *by affecting how fish are harvested and processed*
- *by affecting incentives of harvesters and processors*
- *to keep costs low*
- *to keep fish quality high*
- *to invest in harvesting and processing*
- *to invest in marketing and product development*

By affecting when fish are harvested, fisheries management affects:

- *Whether fishing boats, tenders and processing plants can be used efficiently*
- *Whether fishing, tendering, processing and transportation capacity is sufficient to allow production of high-valued products (like fresh fish) or whether fish have to be processed into lower-valued products (like canned and frozen fish)*

⁴ “What is Good Fisheries Management?” Gunnar Kapp, 2005

- *Whether fish can be delivered when the market wants them*
- *Whether buyers can count on reliable and continuous supply*

Fisheries management directly affects incentives at every level of the seafood industry:

- *to keep costs low*
- *to keep fish quality and value high*
- *to invest in harvesting, processing, and marketing*

If fisheries management leaves fishermen and processors uncertain about whether they will have consistent and reliable access to fish resources, they will not make the investments in harvesting, processing and marketing that are vital to an economically healthy seafood industry.

Fishing and processing is inherently risky because of natural risk (low run years) and market risk (low prices). If management creates additional political risk, it can make long-term investments impossible to justify.”

These observations, drawn from the Alaskan salmon fishery, are highly transferable to the Fraser River sockeye fishery.

About Fraser Sockeye Fishery Management

The over-riding objective of Fraser River sockeye fishery management is conservation of the stocks, with the second objective to provide adequate sockeye access to First Nations throughout the watershed for Food, Social, and Ceremonial purposes. Another top priority is abiding by the terms of the Salmon Treaty with the USA. Tertiary objectives are provision of recreational and commercial fishing opportunities.

Under the current environment facing fishery managers, the certainty of achieving priority objectives is undermined by mounting commercial fisheries, particularly large-scale ones occurring in the ocean.

Commercial fishery management on the Fraser can be characterized as seeking to find low-risk (or risk-less) windows of opportunity for the commercial fleet to “crop” some quantity of sockeye, at some location.

Fishery managers likely recognize that their management decisions impact industry’s revenues and costs, though they may understate the extent of these impacts. Rather than being in a position to mitigate these impacts, however, fishery managers are simply *unable* to address them. Business considerations are not among the variables receiving weight when decisions regarding commercial fisheries are rendered.

Revenue and Cost Considerations - Summary

The key points in the section are summarized as follows:

- Fraser sockeye participants need to address revenues and expenses to compete in the modern seafood industry.
- To address revenues, industry must be market-driven - give the customer what he wants.
- Customers want quality, consistency, predictability - a sockeye salmon justifying its premium position in the marketplace.
- Fraser River catches are highly sporadic and the catch mix is weighted to in-river caught sockeye... fish lacking the attributes the global market demands.
- Fishery management has a strong influence on revenues and expenses in fisheries; appropriate fisheries management can go a long way to addressing business issues.
- Fraser River commercial fishery management is, in practice, indifferent to business issues, to the obvious detriment of the business.

The forgoing paints a bleak picture of key business conditions facing the Fraser River sockeye salmon industry and indeed the business is in dire straits.

The purpose of the analysis provided thus far in the paper is to lay out in detail the root causes of the malaise in the Fraser River sockeye business.

Evaluation Framework

In this section the elements of a financial model are presented. The model allows varying market, production, and fishery scenarios to be evaluated.

The model is based on a combination of hard numbers and reasoned estimates. The assumptions and methodology underlying the model have been vetted by industry leaders, and results are deemed to be very reflective of reality. It is hoped that this analysis can remove some of the "secrecy" surrounding the business side of the Fraser River sockeye salmon fishery.

Key Variables

The model tests the impacts of variations in the following:

- The location of capture - in the ocean, in the estuary (Area 29), or terminal (approaching the spawning grounds). The location of capture has a strong bearing on the intrinsic attributes of sockeye, influencing the potential uses for the fish.

- The type of fishery - the current competitive fishery, or a “reformed” (market driven) fishery. The current fishery is characterized by very brief openings, and an irregular (and unpredictable) fishing pattern. A reformed, or market driven, fishery is assumed to be non-competitive, and conducted at a slow pace throughout the migration. The fishery-type impacts the consistency and pattern of landings, and has a strong influence on quality (handling practices) and marketability.
- Market price levels for Fraser River sockeye products - markets fluctuate up and down, and wholesale price levels have a major impact on financial performance for participants. To a large extent, wholesale prices are set by external forces (supply conditions, competitor’s pricing, exchange rates, etc.). By improving quality and consistency of supply, however, Fraser sockeye participants may exert some (upward) influence over market prices. A range of market prices for each product in the mix (high, medium, low) is provided in this analysis.
- Catch level - the total commercial harvest of Fraser sockeye, in pieces and pounds.

Financial Data

A host of detailed financial assumptions are utilized in the model, including data on finished product yields (which vary with intrinsic fish quality), unit (per pound) selling prices, and unit production costs (including unloading, trucking, processing, packaging, and warehousing). In practice, these specific values vary by company - some operations are more efficient, others less. However, the figures used in the analysis provide a general picture of revenues and costs in the industry. Detailed assumptions are provided in the Appendix.

Key Outputs

Under a range of scenarios, the model demonstrates:

- The wholesale revenue of the Fraser River sockeye salmon fishery - the size of the revenue pie is a critical determinant of returns to participants. Addressing the revenue side of the profitability equation is a key theme of this paper.
- Margins earned by the processing sector - after production and fish-purchase costs are deducted from sales proceeds, processors retain a small percentage to contribute to overheads (assumed to be 12% of selling price in this analysis).
- Fish prices paid to harvesters - harvesters receive the residual value of the fish. From sales proceeds, production

costs and processor's margin are deducted. The balance is paid to harvesters.

Results are provided on both an incremental (per pound of sockeye) basis, and a global basis (the total Fraser harvest). Results are provided for each product line in the Fraser River sockeye product mix, so that differing returns can be readily seen.

Re: Round Pounds vs. Finished Pounds

Readers of seafood industry financial reports must be aware of the difference between figures reported in round pounds (whole fish as they come out of the water), and those reported in finished pounds (product in processed form as it is sold to the wholesale market). As sockeye is processed into its various product forms, removal of head, guts, frames, skin, and any dehydration processes (smoking, drying), result in loss of weight.

Selling prices and processing costs are typically reported in finished pounds. Harvesters generally think in round pound terms - the basis by which they are most often paid. Thus, marketers and fishermen may not be speaking the same financial language when they discuss sockeye prices and costs.

In this analysis, the bulk of figures are presented in finished pound terms, then converted to round pound terms as they translate into fish prices.

The Product Mix for Fraser Sockeye

While Fraser River sockeye fishery participants have been largely sidelined for the past few seasons, many participants have maintained a footprint in the sockeye business, either through other BC fisheries, by sourcing Alaskan sockeye, or by utilizing minuscule Fraser harvests in innovative ways.

For the purposes of this study, a mix of six products is identified, representing the product mix for Fraser River sockeye. The six products, listed from highest-value/best returns to lowest, are:

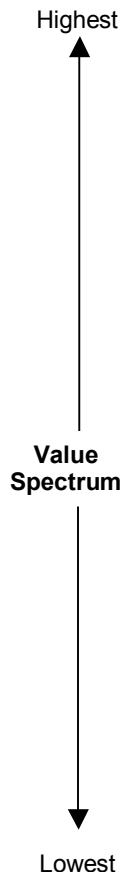
1. Smoked (cold smoked, sliced)
2. Value add portion (a variety of products)
3. ¼ pound canned
4. Frozen headed and gutted
5. ½ pound canned
6. ½ pound canned, standard grade

There are many products not specifically identified in the above list, including meal solutions, various portion-sizes, easy-open cans, skinless-boneless, vacuum pouch, prepared products,

dried, hot-smoked, candied, jerky, and seasoned. These products represent growth and innovation in the industry.

The product mix used in the analysis is deemed to capture both the majority of product volume/value in the fishery, and the spectrum of product values in the marketplace.

The following table provides a capsule summary of the product mix/value spectrum for Fraser River sockeye.



Product	Description	Market Niche	Key Market(s)	Other Products Fitting into Value Spectrum
Smoked Salmon	Cold smoked, sliced, side; premium product requires premium quality fish (colour, oil, appearance, texture)	Top end Small market size for Canadian producers	Canada	Also in this category, other value-added portion, ready-to-eat, high-end canned products (skinless boneless, etc). Many producers have "secret" product/market initiatives.
Value Add Portion	Manufactured product starting from fillet; requires high quality fish (red, firm flesh, bright skin; no visible imperfections acceptable)	North American market; positioned above farmed salmon; marketed as "reddest" salmon (red equates to quality/value)	USA, Canada	
Canned Salmon – ¼ lb	¼ lb canned salmon; requires good-quality salmon (flesh colour, oil content, texture)	High end of commodity canned salmon market	Canada, United Kingdom	
H&G Frozen	Headed and gutted frozen sockeye	Commodity item; used for re-processing into a variety of products. Various sizes and quality grades.	Japan	Also a range of products utilizing more-terminal sockeye: dried, hot-smoked, candied, peppered, etc., including First Nations traditional products.
Canned Salmon – ½ lb	½ lb canned salmon; requires reasonable quality salmon	Commodity item; BC producers generally avoid production of ½ lb from Fraser sockeye	Canada, United Kingdom	
Canned Salmon – Standard Grade	½ lb canned salmon; uses "marginal" quality salmon (terminal)	Low-end commodity item; shrinking market; retailers not keen to carry	Few remaining market options	

This product mix comprises the foundation of the financial analysis making up much of the balance of this paper.

Objective: Optimize the Product Mix

In order to improve returns to Fraser River sockeye fishery participants, a key is "optimizing" the product mix. This means allocating as much raw material as is possible to the highest value products and markets. It implies minimizing the amount of raw material used to produce low-value products.

Two factors are deemed to have the greatest impact on industry's ability to optimize the product mix: the location of capture (ocean, estuary, or terminal), and the type of fishery (competitive or reformed). The intrinsic quality of the fish, together with the way they are handled and the pattern by

which they are landed, has a strong bearing on how industry can utilize Fraser sockeye.

The following table provides assumptions that are critical to this analysis. For varying catch locations and fishery types, resulting product mixes are shown.

Product Mix as a Function of Harvest Location & Fishery Type (% of harvest to product line)	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Guttled Frozen	1/2 lb Canned	1/2 lb Canned Standard
Ocean-caught, reformed fishery	15%	40%	30%	15%	0%	0%
Ocean-caught, competitive fishery	10%	10%	30%	35%	15%	0%
Estuary-caught, reformed fishery	5%	20%	30%	25%	20%	0%
Estuary-caught fish, competitive fishery	5%	5%	25%	30%	35%	0%
Terminal-caught, reformed fishery	0%	0%	0%	0%	50%	50%
Terminal-caught fish, competitive fishery	0%	0%	0%	0%	25%	75%

An ocean-based fishery under a reformed fishery management approach allows a product mix most heavily weighted to high-value, high-return products. A terminal fishery under the current fishery approach yields a product mix heavily weighted to low-value, low-return products, and offers un-proven marketability. The above assumptions simulate reality in that:

- A “maximized” product mix (all production to the highest value product) is not possible, given the small market size of highest-value markets and the brief duration of sockeye run “peaks.” Even a perfectly-managed sockeye fishery can not achieve the value-optimization as seen in year round groundfish fisheries.
- The appeal (value) of the product mix erodes gradually - not drastically - as the capture location and fishery-type gravitate from “best case” toward “worst case.” The purpose of this analysis is to show how seemingly minor changes in product mix have a substantial impact on performance.
- Market sizes and processing capacity constraints are considered.

About “Terminal” Fraser Sockeye

Assessing the marketability and value of terminal-caught Fraser sockeye is a challenging, and highly subjective, exercise.

In this paper, “terminal” is broadly defined as sockeye that have passed through the estuary (Area 29) and are in the freshwater approaches to the spawning grounds. This interpretation implies:

- A wide range of fish attributes, from somewhat bright/fat/red-fleshed, to red-skinned/oil-depleted/skinny.

The percentage of fish meeting the latter description rises as proximity to the spawning grounds increases.

- A range of marketability - as sexual maturity advances with proximity to spawning grounds, the options for marketability diminish.

Perspectives on terminal sockeye quality and marketability, not surprisingly, vary by stakeholder. The following table summarizes impressions gained during the assembly of this paper.

Perspectives on Terminal Sockeye	Industry	Inland First Nations
Fish Quality	Fish quality is poor: diminished oil, fat, flesh colour, general appearance, odour. A marked reduction in quality is noted in specimens harvested above the Fraser Canyon.	Fish quality is different... should not be compared to ocean-caught fish but rather considered on its own merits.
Product Forms/ Distribution Channels	½ lb. canned ½ lb. canned (standard grade)	Local sales (round, dressed), Traditional Products (eg. dried, hot-smoked)
Marketability	Fish not suited to high value markets: customers will pay for red, firm, fat/oily sockeye free of imperfections. A portion of fish harvested below the Fraser Canyon may make ½ lb canned grade. A portion will make ½ lb standard grade. Fish harvested above the Fraser Canyon are seldom marketable at all.	Fish is quite satisfactory for Inland First Nations and their neighbours, confirming it's potential marketability. Pilot product & First Nations branding initiatives show promise.
Growth Potential (marketability under increased harvest levels)	The market size for standard grade canned sockeye is extremely finite. Any growth in this market would be to the detriment of existing products/markets. Marketability of increased volumes of terminal sockeye is not currently feasible.	New product and marketing approaches need to be tested, refined, and expanded. Business development is required to realize full market potential.

Amidst the differing perspectives, there is also common ground:

- Industry cautions that under the current business framework, expanded volumes of terminal sockeye would be unmarketable. However, industry is watching with interest First Nations product/market initiatives utilizing terminal sockeye.
- Inland First Nations, recognizing the chasm between promising pilot-scale initiatives, and handling and selling “industrial” volumes of terminal sockeye, see the need for proper business planning and development before major successes can be achieved.

Weighing the perspectives on terminal sockeye, the following premises underlie the financial analysis presented in this paper:

- Terminal sockeye fits into the low end of the sockeye value spectrum; with fewer market options and lessened quality attributes, it is intuitive that terminal sockeye is of lower value than ocean or estuary specimens.
- Given the current small-scale of terminal sockeye marketing efforts and the challenges presented by the fish, it seems logical that it will take considerable time to develop “industrial-scale” outlets for terminal sockeye.
- If terminal sockeye harvest levels were boosted in the short term, there is a strong likelihood that some portion of the catch would be unmarketable.
- With proper business development, terminal sockeye has the potential to contribute to the financial picture of the Fraser River sockeye business.

With the differing product mixes associated with varying capture locations and fishery-types identified, it remains to evaluate the financial performance of the Fraser River sockeye salmon fishery under varying scenarios.

Financial Results

Grasping concepts is important, but sometimes, seeing the numbers - the “bottom line” - is more instructive. In this section financial schedules are presented to simulate the financial performance of the Fraser River sockeye fishery. Following are two schedules:

- Incremental (per pound) Analysis - showing returns by product line, and weighted average returns to processors and harvesters, given the product mix.
- Fishery-wide Analysis - showing total dollar revenues, expenses, and returns to processors and harvesters.

Fraser River Sockeye Salmon Benchmark Study

Incremental Analysis

Fishery Location & Type: Estuary-caught fish, competitive fishery
Market Price Level: Mid

Incremental (per lb) Analysis	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Gutted Frozen	1/2 lb Canned	1/2 lb Canned Standard	Weighted Average
Product Mix	5%	5%	25%	30%	35%	0%	
Finished Product Recovery % (from rnd)	39%	55%	70%	76%	71%	69%	
Selling Price (per finished lb)	\$ 13.50	\$ 6.50	\$ 5.21	\$ 3.30	\$ 3.65	\$ 2.81	
Production Costs (per finished lb)							
<i>Unload, weigh, ice, tote, transport to plant</i>	0.26	0.18	0.14	0.13	0.14	0.15	
<i>UIC, WCB</i>	0.13	0.09	0.07	0.07	0.07	0.07	
<i>Processing Cost (labour & packaging)</i>	3.75	0.80	1.35	0.48	1.15	1.15	
<i>Carrying Costs (cold/dry storage)</i>	0.20	-	0.16	0.13	0.11	0.11	
<i>Freight to Customer</i>	0.12	0.12	0.12	0.12	0.12	0.12	
Total	\$ 4.46	\$ 1.19	\$ 1.85	\$ 0.93	\$ 1.59	\$ 1.60	
Processor's Margin (per finished lb)	1.62	0.78	0.63	0.40	0.44	0.34	
Production Cost plus Margin (per finished lb)	\$ 6.08	\$ 1.97	\$ 2.47	\$ 1.33	\$ 2.03	\$ 1.93	
Available for Harvesters (per finished lb)	7.42	4.53	2.74	1.98	1.62	0.88	
Available for Harvesters (per round lb)	\$ 2.90	\$ 2.49	\$ 1.90	\$ 1.50	\$ 1.14	\$ 0.60	
Weighted Average Processor Margin (rnd lb)							\$ 0.38
Weighted Average Fish Price (rnd lb)							\$ 1.60

Fishery-Wide Analysis

Harvest Level: 875,000 fish 5,031,250 lbs
Fishery Location & Type: Estuary-caught fish, competitive fishery
Market Price Level: Mid

Fraser Sockeye Fishery Analysis	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Gutted Frozen	1/2 lb Canned	1/2 lb Canned Standard	Total Fraser Sockeye
Product Mix (round fish to product line)	5%	5%	25%	30%	35%	0%	100%
Finished Product (lbs)	98,385	138,359	875,290	1,147,125	1,243,015	-	3,502,174
Sales Revenue (Wholesale Value)	\$ 1,328,199	\$ 899,336	\$ 4,558,800	\$ 3,790,787	\$ 4,531,824	\$ -	\$ 15,108,945
Production Costs							
<i>Unload, weigh, ice, tote, transport to plant</i>	25,156	25,156	125,781	150,938	176,094	-	503,125
<i>UIC, WCB</i>	12,578	12,578	62,891	75,469	88,047	-	251,563
<i>Processing Cost (labour & packaging)</i>	368,944	110,688	1,185,288	550,620	1,424,288	-	3,639,827
<i>Carrying Costs (cold/dry storage)</i>	19,923	-	136,764	151,631	135,955	-	444,273
<i>Freight to Customer</i>	11,806	16,603	105,035	137,655	149,162	-	420,261
Total	438,408	165,025	1,615,758	1,066,313	1,973,545	-	5,259,049
Processor's Margin	159,384	107,920	547,056	454,894	543,819	-	1,813,073
Production Cost plus Margin (per finished lb)	597,791	272,945	2,162,814	1,521,207	2,517,364	-	7,072,122
Available for Harvesters	730,407	626,391	2,395,985	2,269,580	2,014,461	-	8,036,823
Available for Harvesters (per round lb)	\$ 2.90	\$ 2.49	\$ 1.90	\$ 1.50	\$ 1.14	\$ -	\$ 1.60

This scenario is intended to resemble the financial picture in the Fraser River sockeye fishery for the 2005 season. It assumes:

- Fish are harvested in the “estuary.” In fact, today’s harvest features a blend of ocean, estuary, and terminal fish. It is recognized the Area E fisheries in Area 29 have been extremely limited in recent years, but for study purposes, the harvest blend is deemed to “average-out” to that associated with estuary harvest.
- A competitive fishery - short openings, few openings, unpredictable openings.
- A harvest of 875,000 fish - the eight-year (two cycle) average.
- mid-level market prices (prices typical of the 2005 season, not necessarily prices prevailing in the spring/summer of 2006⁵).

Insights arising out of the financial schedules are as follows:

Incremental Analysis:

- The figure shows returns per pound of production allocated to each product line. For instance, a pound of sockeye allocated to the “smoked side” product form would return \$1.62 per finished pound to the processor, and \$2.90 per round pound to the harvester. At the other end of the spectrum, a pound of sockeye allocated to “1/2 lb standard canned” would return \$0.34 to the processor and \$0.60 to the harvester.
- The weighted average returns arising from the product mix shown are \$0.38 per round pound to processors (margin) and \$1.60 per round pound to harvesters.
- From a business perspective, there is ample room for improving the make-up of the product mix to improve per-pound returns to stakeholders.

Fishery-Wide Analysis:

- Sales revenue - the wholesale value of the harvest is about \$15 million.
- Processor margins total \$1.8 million.
- The ex-vessel value of the harvest is about \$8 million.
- Spread amongst a host of processors and the southern seine, gillnet, and troll fleets, these revenue levels are clearly inadequate to support stakeholders, or even make a meaningful contribution to their operations.

⁵ as this report is finalized in July of 2006, market prices for sockeye have softened appreciably from levels seen in 2005.

- From a business perspective, the scale of the Fraser sockeye fishery is small - compared to the past glory of the fishery, and compared to other BC commercial fisheries. Larger catches provide the opportunity to improve the level of economic benefit accruing to stakeholders.

Getting the Most From Every Pound...

Extracting maximum value from every pound of fish harvested is a key business objective, particularly when catch levels are highly constrained. The following table summarizes returns to participants under a range of capture locations (ocean, estuary, or terminal) and fishery-types (reformed or competitive), assuming the entire harvest is directed to one fishery-type.

Catch Level (pieces) 875,000 fish

Capture Location:	Ocean	Ocean	Estuary	Estuary	Terminal	Terminal
Fishery type:	Reformed	Competitive	Reformed	Competitive	Reformed	Competitive
Market Price level:	Med	Med	Med	Med	Med	Med
Sales Revenue (wholesale value of catch)	\$ 19,142,962	\$ 16,719,625	\$ 16,144,705	\$ 15,108,945	\$ 10,999,121	\$ 10,209,619
Production Costs	5,221,917	5,348,423	5,053,752	5,259,049	5,435,199	5,403,221
Processors Margin	2,297,155	2,006,355	1,937,365	1,813,073	1,319,895	1,225,154
Available for Harvesters	11,623,890	9,364,846	9,153,589	8,036,823	4,244,027	3,581,244
Available for Harvesters (per round lb)	\$ 2.31	\$ 1.86	\$ 1.82	\$ 1.60	\$ 0.84	\$ 0.71

For the same scale of fishery (875,000 fish caught) and the same market conditions (mid-level), results differ dramatically. The reason for the variation is the impact that capture location and fishery-type have on the product mix. A higher valued product mix yields superior returns for participants. This calculation assumes that, for this catch level, all terminal production would be marketable - an assumption that is untested.

The next figure shows per-pound prices to harvesters under the same range of capture locations and fishery-types, but also flexing market price conditions (high, mid, or low).

Capture Location:	Ocean	Ocean	Estuary	Estuary	Terminal	Terminal
Fishery Type:	Reformed	Competitive	Reformed	Competitive	Reformed	Competitive
Market Price Level:	Low	Low	Low	Low	Low	Low
Available for Harvesters (per round lb):	\$ 1.84	\$ 1.43	\$ 1.41	\$ 1.21	\$ 0.60	\$ 0.50
Market Price Level:	Med	Med	Med	Med	Med	Med
Available for Harvesters (per round lb):	\$ 2.31	\$ 1.86	\$ 1.82	\$ 1.60	\$ 0.84	\$ 0.71
Market Price Level:	High	High	High	High	High	High
Available for Harvesters (per round lb):	\$ 2.77	\$ 2.29	\$ 2.23	\$ 1.99	\$ 1.08	\$ 0.92

Returns to Harvesters

Returns to harvesters are the most volatile element of the financial equation for Fraser sockeye. When values per pound of sockeye salmon rise, harvesters benefit the most; when they

fall, harvesters bear the brunt. This is because production costs in the industry are substantial, and are linked to production levels, not sales values. Harvesters receive the residual value of the fish - the balance remaining after production costs and processor margins are deducted.

The wide range of values shown in the preceding table disproves the notion held by some harvesters that market conditions and fish attributes are not their concern.

Growing the Harvest

Higher catches provide an obvious means of improving revenues in the Fraser River sockeye salmon fishery. The benefits of increased catches are most pronounced when the product mix is also addressed.

Catch Level (pieces) 2,000,000

Base Case Highest Value Lowest Value*

Capture Location:	Estuary	Ocean	Terminal
Fishery type:	Competitive	Reformed	Competitive
Market Price level:	Med	Med	Med
Sales Revenue (wholesale value of catch)	34,534,732	43,755,343	11,668,136
Production Costs	12,020,683	11,983,672	6,175,110
Processors Margin	4,144,168	5,250,641	1,400,176
Available for Harvesters	18,369,882	26,521,029	4,092,850
Available for Harvesters (per round lb)	\$ 1.60	\$ 2.31	\$ 0.36

*assumes terminal harvest is 50% marketable

Catch Level (pieces) 3,000,000

Base Case Highest Value Lowest Value*

Capture Location:	Estuary	Ocean	Terminal
Fishery type:	Competitive	Reformed	Competitive
Market Price level:	Med	Med	Med
Sales Revenue (wholesale value of catch)	51,802,098	65,633,014	14,001,763
Production Costs	18,031,024	17,975,508	7,410,132
Processors Margin	6,216,252	7,875,962	1,680,212
Available for Harvesters	27,554,822	39,781,544	4,911,420
Available for Harvesters (per round lb)	\$ 1.60	\$ 2.31	\$ 0.28

*assumes terminal harvest is 40% marketable

Catch Level (pieces) 4,000,000

Base Case Highest Value Lowest Value*

Capture Location:	Estuary	Ocean	Terminal
Fishery type:	Competitive	Reformed	Competitive
Market Price level:	Med	Med	Med
Sales Revenue (wholesale value of catch)	69,069,464	87,510,686	15,401,940
Production Costs	24,041,365	23,967,344	8,151,145
Processors Margin	8,288,336	10,501,282	1,848,233
Available for Harvesters	36,739,763	53,042,059	5,402,562
Available for Harvesters (per round lb)	\$ 1.60	\$ 2.31	\$ 0.23

*assumes terminal harvest is 33% marketable

Terminal Marketability in an Expanded Harvest

As stated previously, the prospects for marketing growing volumes of terminal sockeye are uncertain. While smoked, value-added, and canned markets are established, well understood, and able to absorb increased Fraser River production, product/market initiatives for terminal sockeye, particularly fish harvested above the Fraser Canyon, are at the developmental stage. In order to acknowledge the promise of terminal sockeye initiatives, while recognizing their current limitations, it is assumed that, as harvest volumes grow, the marketable percentage of the catch declines. A schedule of "best-guess" terminal-sockeye marketability assumptions is appended to this report.

Results

The adjacent analysis shows snapshot financial estimations for three annual catch levels: 2 million, 3 million, and 4 million fish. The "base case" fishery is compared to the highest value and lowest value scenarios.

The purpose of this analysis is to quantify how the business scale of the fishery grows as harvest volumes escalate. As the business scale grows, the dollar-value discrepancy between

high-value and low-value product mixes grows wider.

Note that, in the “lowest value” scenarios per-pound returns to harvesters decline as catch volumes increase. This is not because of declining values for marketable fish, but is attributable to a decreasing *percentage* of marketable sockeye.

By combining an improved product mix with larger harvest volumes, the value of the Fraser River sockeye salmon harvest grows exponentially, as do returns to participants.

The wisdom - and financial appeal - of strategies to maximize the economic benefit of available resources are readily apparent. “Highest value” returns are not theoretical, but can be achieved through cooperation and sound execution. Given this, vastly lesser returns should not be tolerated by stakeholders.

Financial Results – Summary

This section offers some rather detailed quantitative analysis. The analysis utilizes reasonable and realistic assumptions to provide calculations of the benefits accruing to participants in the commercial Fraser River sockeye salmon fishery under a range of scenarios.

It is intended that this analysis:

- Provides some financial information (regarding revenues and costs in the industry) that may be new and informative to some participants.
- Provokes thought on strategies for improving the business performance of the Fraser River sockeye salmon fishery.
- Provides a framework for analyzing various options for rebuilding the Fraser River sockeye business.

Rebuilding the Fraser River Sockeye Business

This paper concludes with some subjective views regarding the rebuilding of the Fraser River sockeye salmon business.

Considerations Underlying a Strategy

The following advice is offered to Fraser River sockeye stakeholders as they contemplate a business turnaround strategy.

Forget About the Past...

In years past, the Fraser River sockeye fishery was a large-scale endeavour, serving as the backbone of the BC salmon industry. The conditions contributing to the strength of the Fraser River sockeye business no longer exist, and will not return:

- Industrial-scale harvests (average catch 7 million fish for the 1990-1997 period) occurred under a mixed-stock fishery. With allocation priorities, a precautionary management approach, and Species at Risk Act realities entrenched in policy and legislation, industrial-scale mixed stock fisheries are a thing of the past.
- Fraser sockeye marketers have lost their “clout.” Japan is no longer a default high-value outlet for frozen headed and gutted sockeye; both market size and prices have shrunk. BC producers have been displaced from the ½ pound canned market by low-cost competition from Alaska. Our expedient, high-value options for selling the pack have largely evaporated.

The rules of engagement prevailing in the past have fundamentally changed.

Don't Accept the Present...

Recent developments in the Fraser sockeye fishery have effectively grounded the business. An industrial activity is now little more than a cottage one (2005 harvest level 128,000 fish, with a value of 1/100 of that earned in 1994). Business considerations have been subjugated to higher priority objectives.

Acknowledgement of a challenging new business environment and the current dismal state of the industry should not imply “surrender,” however. The Fraser River sockeye fishery has ample potential to be re-built to earn significant revenues and returns for participants. Among the strengths to build upon:

- Strong escapements seen in recent years provide the potential for healthy runs in the future. The Fraser River is still one of the world’s largest sockeye producing systems. There is no doubt that a system of this size and productivity can support meaningful commercial activity.
- Growth in the North American market for fresh/frozen portions, and a diverse Fraser sockeye product mix offer marketing upside.
- Industry infrastructure, though depleted, comprises a strong base for re-building. Renewed investment in the industry will follow improved business prospects.

Given the latent resource and business opportunities facing the Fraser sockeye industry, continued floundering is simply not acceptable.

Consider Lessons Learned

Alaskan experiences prove illuminating as Fraser participants consider a business turnaround. Key insights:

- Strong harvest volumes are an ingredient, but not a guarantee of, business success. Alaskan fisheries faced crisis in recent years in spite of healthy catches. Shifting markets and growing competition necessitated major business adjustments.
- Marketing (branding, quality programs) can be effective in differentiating regional product, gaining price premiums, and influencing consumer perceptions. However, high-value niches are quickly filled.
- Designing a fishery to address business shortcomings (landings pattern, quality, marketability) leads directly to improved revenues and decreased costs. However, industry restructuring will accompany fishery reform.

Inaction does not work. Half-measures don't address complex problems. Full support of key stakeholders is required to ensure that new strategies are given the chance to succeed.

Align Interests

It has been shown in this study the capture location (ocean, estuary, or terminal) strongly influences marketability. In reality, determining the location of capture is not a simple business decision, but a complex political issue. A primary impediment to implementing business reform in the Fraser River sockeye salmon fishery is the division between key interests:

- Industry wishes to restore harvest levels in the ocean where, it argues, the fish are most valuable.
- First Nations wish to establish enhanced commercial access to sockeye. Many First Nations are located in the Fraser watershed, implying a terminal harvest. These First Nations argue that they have developed lucrative markets for traditional products utilizing terminal fish.
- Government is balancing multiple objectives: ensuring that multiple conservation objectives are met, meeting fiduciary responsibilities to First Nations for food, social and ceremonial fish, and providing for economic opportunities for both First Nations and industry.

Government is thus in a difficult position. Growing the "ocean" fishery could be viewed as compromising conservation and First Nations access to the resource. Growing the terminal harvest could be viewed as un-compensated re-allocation of the resource away from the commercial sector. The result of this dilemma is the "grounded" business described in this paper: a diminutive fishery, with catch location gravitating to more-terminal areas. Neither industry nor First Nations are satisfied with the scale or profitability of the business.

Government's balancing of objectives would be greatly simplified if the commercial industry and inland First Nations could "get on the same page." To establish a productive working relationship, both parties' fears must be addressed:

- Industry fears that fish caught terminally will be lost from an access and marketability perspective.
- First Nations fear that if they do not access fish as they pass through their territories, they will not access them at all.

Industry and First Nations share a common desire to grow sustainable businesses. Industry is interested in working with First Nations to access sockeye and add value to the harvest. First Nations are interested in utilizing industry's expertise and infrastructure to expand their product mix and market exposure. Both industry and First Nations recognize the folly of pursuing separate paths. There is considerable will to work together.

Developing specific strategies to build bridges between commercial industry and inland First Nations interests is well beyond the scope of this study, but it is important to note that a successful partnership between the parties will pave the way for implementation of required business initiatives.

A Vision of the Fraser Sockeye Business

Rather than providing a prescription for re-building the Fraser River sockeye business (stakeholders will determine implementation details), a vision describing the Fraser sockeye business of the future is now provided. This vision draws upon the substantial input of industry stakeholders gained during the development of this report.

Scope of the Fishery

The Fraser sockeye system is a sizeable one that can support substantial harvests. It is a far larger system than either Copper River or Chignik (annual catches of about 1.5 million sockeye). Assuming run-sizes similar to those seen in recent cycles, annual Fraser sockeye harvests in the 2-4 million fish range should be achievable.

From current catch levels (averaging less than one million fish), harvests will be grown systematically, as new fishery techniques are tested, and as markets are developed.

The scope of the future fishery will be less than the industrial fishery of the past, but far greater than the cottage-scale fishery of today.

Harvest Location

While participants will recognize the marketability and value benefits of harvesting sockeye in the ocean, conservation constraints will dictate that a portion of the harvest will occur in

more terminal areas. Harvest strategy can be characterized as using innovative strategies to mount low-risk ocean-based fisheries, while using in-river harvest as a means of exploiting harvestable surpluses.

Harvest location - specifically, maximizing the amount of product caught in the ocean - will be an explicit factor in fishery management. Making the most of fish harvested terminally will be a business key.

Fishery Type

The fishery will be market driven, allowing stakeholders to best meet customer requirements. Elements of a market-driven fishery:

- Improved precision in forecasting runs and harvests to facilitate business planning and instil confidence in customers and stakeholders.
- Harvests throughout the migration, allowing for sustained fresh market penetration; small-scale “bites” on the shoulders of the season, larger harvests during the peaks.
- A non-competitive fishery focused on quality, value and cost-efficiency. Pilot fisheries conducted by the commercial fleet to-date (Barkley Sound, San Juan, Johnstone Strait, Area F troll) provide a sampling of benefits. The Chignik Cooperative provides a larger-scale illustration.
- A selective, sustainable fishery that satisfies the concerns of both conservation-minded fishery managers and conscientious consumers.

A fishery designed to meet the needs of the marketplace paves the way for proper business development: investment in product and market development, technology, research, and training and education.

Industry rationalization will accompany a reformed fishery management system. Stakeholders and government will anticipate the scope of rationalization, and implement adjustment programs for those adversely affected.

Product and Market Development

With greater emphasis on harvest location, handling practices, and fishing patterns, industry will be able to allocate more sockeye to higher value products, resulting in a more valuable product mix.

Niche product and market innovations initiated by small-scale entrepreneurs and First Nations will be encouraged and developed over time. High quality commodity products will continue to comprise the majority of production and value, with USA fresh markets providing attractive growth opportunities. The

Fraser sockeye industry will be diversified and competitive in the breadth of its product mix.

Marketing Support

A substantial generic marketing program supports Fraser River stakeholders' product and market development initiatives (just as ASMI supports the Alaskan salmon industry). The profile of Fraser sockeye amongst wholesalers will be restored, and consumers will become aware of this top-quality sockeye.

Consolidated Commercial Fishery

Stakeholders have recognized that mounting a multitude of fisheries for a multitude of users works counter to the objective of growing harvest levels. Fisheries have been consolidated, reducing management complications. The divisions between commercial gear types, and between commercial and aboriginal interests have blurred. With allocation issues settled, and harvesters provided with secure access to a share of the resource, the focus has shifted to maximizing the value of the harvest. Industry and First Nations businesses are harmonized, with harvest, product, and market decisions made on business, not territorial, grounds.

A Competitive Business

The competitive environment facing Fraser River sockeye producers grows ever more challenging. There are more distractions, added costs, and competition than ever. Alaskan fisheries, the pace setters in the sockeye business, have continued to refine and improve their business practices. The fundamental business changes effected by Fraser participants allow them to hold their own in the evolving business environment. There is no standing still, however.

A Substantial Business

The economic scope of the Fraser River sockeye fishery in the envisioned scenario is substantial - dramatically greater than levels seen in the last two cycles - though modest in comparison to historic levels.

The following table provides a snapshot of envisioned business performance (compared to 2005).

	2005 Scenario	Future Potential (Low)	Future Potential (High)
<i>Harvest Level (pieces)</i>	128,000	2,000,000	4,000,000
<i>Sales Revenue</i>	\$ 2,210,223	\$ 36,902,182	\$84,840,542
<i>Production Costs</i>	769,324	11,551,432	23,379,324
<i>Processor's Margin</i>	265,227	4,428,262	10,180,865
<i>Available for Harvesters</i>	1,175,672	20,922,488	51,280,353
<i>Available for Harvesters (per round lb)</i>	\$ 1.60	\$ 1.82	\$ 2.23

With catches between two and four million fish, refinement of the product mix, and development of markets (and prices) over time, the Fraser sockeye business can exponentially increase returns to processors and harvesters.

These gains are tangible, realistic, and can be captured through cooperation amongst Fraser River sockeye salmon fishery stakeholders.

Closing Observation

In a "standard" business case (for example, a struggling corporation), a management team is charged with the task of devising a turnaround strategy. The difficulty lies in recognizing complex business problems, and identifying solutions that are within the capital constraints of the firm.

In the case of Fraser sockeye (certainly not a standard business case), the situation is reversed: the difficulty lies in *empowering a team of individuals to address business problems*, where the solutions are readily apparent.

The contractor does not under-estimate the hurdles to getting Fraser River sockeye salmon fishery stakeholders on the same page and working together. It is hoped, however, that this analysis can provide a measure of guidance and incentive for doing so.

Appendix 1: Financial Model Assumptions

Finished Product Recovery (from round)	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Gutted Frozen	1/2 lb Canned	1/2 lb Canned Standard
Ocean-caught	41%	57%	71%	78%	72%	70%
Estuary-caught (Area 29)	39%	55%	70%	76%	71%	69%
Terminal-caught*	37%	52%	68%	74%	69%	67%

* terminal fish may not be marketable in certain product forms

Product Mix as a Function of Harvest Location & Fishery Type (% of harvest to product line)	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Gutted Frozen	1/2 lb Canned	1/2 lb Canned Standard
Ocean-caught, reformed fishery	15%	40%	30%	15%	0%	0%
Estuary-caught, reformed fishery	5%	20%	30%	25%	20%	0%
Terminal-caught, reformed fishery	0%	0%	0%	0%	50%	50%
Ocean-caught, competitive fishery	10%	10%	30%	35%	15%	0%
Estuary-caught fish, competitive fishery	5%	5%	25%	30%	35%	0%
Terminal-caught fish, competitive fishery	0%	0%	0%	0%	25%	75%

Selling Price (per finished lb, \$CDN)	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Gutted Frozen	1/2 lb Canned	1/2 lb Canned Standard
Low	12.00	5.50	4.58	2.59	3.13	2.50
High	15.00	7.50	5.83	4.02	4.17	3.13
Mid	13.50	6.50	5.21	3.30	3.65	2.81

Production Costs (exclude fish purchases) - \$	Smoked Side	Value Add Portion	1/4 lb Canned	Headed & Gutted Frozen	1/2 lb Canned	1/2 lb Canned Standard
Fish Acquiring (exclude fish purchase) \$ per round lb						
Unload, weigh, ice, tote, transport to plant	0.10	0.10	0.10	0.10	0.10	0.10
UIC, WCB	0.05	0.05	0.05	0.05	0.05	0.05
Production Costs per finished lb						
Processing Cost (labour & packaging)	3.75	0.80	1.35	0.48	1.15	1.15
Carrying Costs (cold/dry storage, interest)*	0.20	-	0.16	0.13	0.11	0.11
Freight to Customer	0.12	0.12	0.12	0.12	0.12	0.12

* carrying costs vary with inventory value

Inventory months	6	0	6	4	6	8
Carrying cost/month (% of selling price)	0.25%	0.5%	0.5%	1.0%	0.5%	0.5%

Appendix 2: Terminal Sockeye Marketability Assumptions

Harvest Level (pieces)	2,000,000	3,000,000	4,000,000
Harvest Level (lbs)	11,500,000	17,250,000	23,000,000

Financial Results if Harvest 100% Marketable:

Sales Revenue (wholesale value of catch)	\$ 23,336,272	\$ 35,004,408	\$ 46,672,545
Production Costs	12,350,220	18,525,329	24,700,439
Processors Margin	2,800,353	4,200,529	5,600,705
Available for Harvesters	8,185,700	12,278,550	16,371,400
Available for Harvesters (per round lb)	\$ 0.71	\$ 0.71	\$ 0.71

Marketability Assumptions (% of harvest)	50%	40%	33%
Lbs Marketable	5,750,000	6,900,000	7,590,000
Lbs Un-marketable	5,750,000	10,350,000	15,410,000

Financial Results Under Marketability Assumptions

Sales Revenue (wholesale value of catch)	\$ 11,668,136	\$ 14,001,763	\$ 15,401,940
Production Costs	6,175,110	7,410,132	8,151,145
Processors Margin	1,400,176	1,680,212	1,848,233
Available for Harvesters	4,092,850	4,911,420	5,402,562
Available for Harvesters (per round lb)	\$ 0.36	\$ 0.28	\$ 0.23