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OCEAN RANCHING

FREE RANGE SALMON - AN UNREALIZED OPPORTUNITY FOR BRITISH COLUMBIA'S COASTAL COMMUNITY DEVELOPMENT

A PRE- FEASIBILITY 'BUSINESS CASE' ASSESSMENT OF A
BRITISH COLUMBIA COASTAL ZONE OCEAN RANCHING
STRATEGY

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Established in 1931 the Native Brotherhood of British Columbia (NBBC) is recognized as Canada's oldest active Native organization, and a senior BC commercial fishing organization. Over the years, the NBBC has been a very powerful voice on fisheries issues, and on many other concerns affecting the well being of BC's native coastal communities. The management and development of coastal renewable resources was and continues to be an integral component of this equation. The NBBC was formed by a group of coastal villages solely for the betterment of Native people. As the organization grew so did its achievements. A better education system, the right to vote for Native people, improved medical care, better jobs and better living conditions at the canneries.

Three years ago, the NBBC was given a strong mandate from many coastal First Nations to facilitate the implementation of a coastal zone management and development strategy that would include but not be restricted to fisheries, all other marine resources, tourism, eco-tourism, forestry and other resources with the potential to create economic opportunities.

At the November 2002 convention, about 150 coastal zone First Nations people representing over 50 communities agreed on the importance of focussing on the unique and critical issues First Nations face as ocean peoples living in places where economies are undergoing a major transition. Specifically the First Nations pledged to work together again as in past, to ensure that their particular and distinctive way of life as First Nations Ocean Peoples is preserved and enhanced. The communities and organizations agreed that the best way to re-establish and expand our presence in coastal zone economies is through the facilitation and coordination of the NBBC. Our focus will be on the development of economic partnerships with other parties who share the goal of developing sustainable economies in coastal communities. In this regard, ocean ranching has been given a very high priority by the NBBC Executive.

EXECUTIVE SUMMARY

FREE RANGE SALMON - AN UNREALIZED OPPORTUNITY FOR BRITISH COLUMBIA'S COASTAL COMMUNITY DEVELOPMENT

ASSESSMENT - B.C. OCEAN RANCHING PRE-FEASIBILITY STUDY

The Federal government in general and the Department of Fisheries & Oceans in particular strongly support the continued growth of the British Columbia salmon fish farm industry. The same is true with respect to the Provincial Government.

Many coastal First Nations as well as a number of non-Native organizations have had and continue to have very serious concerns about the impacts associated with the industry. In fact, many remain adamantly opposed to expansion. While most recognize that salmon farms are here to stay, a strategic question is increasingly being asked - is there a viable and generally acceptable alternative to salmon farms that should be considered for our coastal zone?

With this question in mind, an 'Ocean Ranching' Resolution was passed by consensus at the 71st Native Brotherhood of British Columbia (NBBC) Convention held in November 2002 in Burnaby. This Resolution mandated the NBBC to facilitate the review and assessment of ocean ranching as an alternative to fish farms in coastal British Columbia waters, to facilitate a coastal workshop on the issue, and to develop a strategy and action plan. The Convention was attended by representatives of more than 50 First Nations and First Nations organizations. At the recent November 2004 NBBC Convention a follow-up Resolution was passed by consensus that supported the NBBC in its pursuit of the funding and resources required for the next Phase of the Ocean Ranching Initiative.

A fundamental issue is that there has never been a comprehensive economic and social benefit/cost assessment and comparison of wild, farmed and ocean ranched fish production from a British Columbia perspective that has included the input from First Nations and the other key parties. Equally important, there has never been a scientific risk assessment and comparison of the forms of fish production that has included appropriate input from First Nations and the other key parties. This issue must be addressed from a strategic perspective. Given this fact, the NBBC received a Phase II contract from Western Economic Diversification (WD) to conduct a 'B.C. Ocean Ranching Pre-Feasibility Assessment'.

The specific NBBC project objectives were to: establish a partnership based and NBBC facilitated Ocean Ranching Steering Committee to examine all of the factors that bear on the feasibility of ocean ranching in B.C.; assess the business case at the pre-feasibility level, and using the results, develop a multi-purpose ocean ranching 'Power Point' presentation; and develop a partnership based 'Ocean Ranching Joint Working Paper' building upon a draft NBBC Discussion Paper.

The central question addressed during the pre-feasibility study was: *"Considering the Alaskan experience and from the perspective of the interested parties, is ocean ranching a viable and desirable option for British Columbia to which we should devote more time, money and effort - YES or NO?"*

The review and evaluation of the Alaska ocean ranching experience is a key element of the pre-feasibility business case assessment of a BC coastal zone ocean ranching strategy. The Joint Working Paper reviews the Alaskan experience in some detail, and provides insights for consideration with respect to its history, the basic structure of the industry, the legislative and regulatory structure, how it is financed and capitalized, the production trends, the economic, social and community benefits, and current market challenges.

This assessment of the results of the Alaska experience suggest that the Alaskans, based upon their more than a quarter century of experience, have identified and addressed to the general satisfaction of their key stakeholders most of the key issues and concerns that are being raised by British Columbians. Wild salmon and ranched salmon in Alaska are both near record highs after 30 years of ocean ranching; fishers and the State appeared to have seen a good return on their investment; the program is run with broad public and fisher support and input; and substantial benefits have flowed to local communities.

Based upon the project results, at a pre-feasibility level the answer to the question is **YES**, and more time, money and effort should be devoted to exploring ocean ranching as a desirable option for British Columbia. Although the pre-feasibility assessment suggests that all things considered it is worthwhile to move forward, there are a number of issues and questions associated with, for example, institutional constraints and marketing that have to be explored in considerably more detail. Given these issues, if it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy the next logical step should be a much more detailed feasibility level study.

Given the current institutional context in BC, it is not reasonable to expect the Government to take the major step of enabling ocean ranching coast-wide all at once. Based upon stakeholder support and the results of this pre-feasibility study, it is more realistic to encourage the Government, mainly DFO, to agree *in-principle* that the experience of ocean ranching in Alaska is promising enough to make it worthwhile to experiment with adapting the concept to BC. As a key element of a feasibility study, it is reasonable to propose that government support be granted for two or more Pilot Projects.

Given the results of the NBBC Phase II 'B.C. Ocean Ranching Pre-Feasibility Assessment', the following recommendations are presented for consideration by the Ocean Ranching Project Steering Committee:

1. Based upon Phase II project results, a detailed feasibility level study should be conducted as the next logical step required to move forward on a B.C. ocean ranching strategy;
2. With this in mind and supported by the members of the Ocean Ranching Steering Committee, an NBBC facilitated Phase III partnership and pilot project based B.C. Ocean Ranching Feasibility Study proposal should be developed, budgeted and submitted immediately. This proposal should detail the funding, resourcing and time frames required to undertake a feasibility level ocean ranching project that would focus on communications, institutional constraints, market analysis, financing and ownership models and pilot projects;

3. A carefully phased and targeted communications strategy should be developed and implemented to confirm stakeholder support;
4. With regard to a strategy to deal with institutional constraints to implementing a 'made in BC' ocean ranching strategy, an assessment should be made that would include but not be limited to: the DFO wild salmon policy; MAFF aquaculture policy; Treaty negotiation; the Salmonid Enhancement Program (SEP) and SEP hatchery policy including cost recovery and divestiture; and the Pearse/MacRae initiative;
5. With regard to an ocean ranching market analysis, Phase III objectives should include but not be limited to: short, intermediate and long term domestic and international market and pricing assessments; an assessment of values and optimal levels of production given species based harvest levels by the various sectors; and an assessment of where will benefits likely outweigh costs;
6. With regard to an ocean ranching financing analysis, Phase III objectives should include but not be limited to an assessment of what combination of contributions could get a Pilot Project off the ground and make it sustainable? For instance, a landing tax, license fees, Cost Recovery Harvests, grants, loans, and land or facility transfers may be considered; and
7. The Phase III feasibility level ocean ranching analysis should be based upon a Pilot Project evaluation and assessment process that would entail detailing several good potential sites. This assessment would entail factors such as, but not limited to: projected production targets by species for specific sites; monitoring and assessment requirements; market assumptions and price by species; management policies and transportation; and infrastructure costs.

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February 16, 2005

PROJECT JOINT WORKING PAPER

FREE RANGE SALMON - AN ALTERNATIVE STRATEGY TO FISH FARMS?

***ASSESSMENT - B.C. OCEAN RANCHING PRE-FEASIBILITY
STUDY***

WHAT DID WE LEARN - AND WHAT SHOULD HAPPEN NEXT?

1.0 BACKGROUND & CONTEXT

The Federal government in general and the Department of Fisheries & Oceans in particular strongly support the continued growth of the British Columbia salmon fish farm industry. The same is true with respect to the Provincial Government.

Many coastal First Nations as well as a number of non-Native organizations have had and continue to have very serious concerns about the impacts associated with the industry. In fact, many remain adamantly opposed to expansion. While most recognize that salmon farms are here to stay, a strategic question is increasingly being asked - is there a viable and generally acceptable alternative to salmon farms that should be considered for our coastal zone?

With this question in mind, an '*Ocean Ranching*' Resolution was passed by consensus at the 71st Native Brotherhood of British Columbia (NBBC) Convention held on November 24th through 26th, 2002 in Burnaby (Attachment #1). This Resolution mandated the Native Brotherhood of British Columbia to facilitate the review and assessment of ocean ranching as an alternative to fish farms in coastal British Columbia waters, to facilitate a coastal workshop on the issue, and to develop a strategy and action plan. Representatives from more than 50 First Nations and First Nations organizations attended.

1.1 THE ISSUE

A fundamental issue is that there has never been an independent and comprehensive economic and social benefit/cost assessment and comparison of wild, farmed and ocean ranched fish production that has included the input from First Nations and the other key parties. Equally important, there has never been a scientific risk assessment and comparison of the forms of fish production that has included the input from First Nations and the other key parties. This issue must be addressed from a strategic perspective.

1.2 A FIRST STRATEGIC STEP - AN OCEAN RANCHING MINI-CONFERENCE

As a first step to begin to address this issue, the NBBC secured a Phase I contract from Western Economic Diversification (WD) to conduct an ocean ranching working session with a wide range of interested parties. The April 2003 'Native Brotherhood of B.C. Facilitated Ocean Ranching 'Mini-Conference' - *An Unrealized Opportunity for British Columbia's Coastal Community Development?*' was held in Nanaimo, B.C. There was a general consensus:

1. That it would in-principle be appropriate to form a partnership to further consider ocean ranching as a potentially strategic economic opportunity for BC coastal communities. It was recognized that the Conference was but a first step in coalition building, and that there were a number of other key players that must be brought into the picture; and
2. That significant funding and resourcing will be required to effectively move a BC ocean ranching strategy forward. As one key element of a resourcing strategy, the session was viewed by both WD and the NBBC as an initial opportunity to explore the potential for establishing a long term and mutually beneficial partnership

1.3 A VISION

There was strong agreement by the Mini-Conference participants that a common vision and associated set of principles would be required to establish a viable ocean ranching partnership. With this in mind the following draft ocean ranching vision and principles were developed for review and comment, and are presented to help set the context for further dialogue within a pilot project approach.

VISION

'The revitalization, maintenance and the long term sustainability and diversity of west coast salmon stocks is essential to the socio-economic and environmental well being of British Columbia coastal communities.'

1.4 A SECOND STRATEGIC STEP - A PRE-FEASIBILITY STUDY

Based upon the positive results of Phase I, the NBBC received a Phase II contract from Western Economic Diversification (WD) to conduct a 'B.C. Ocean Ranching Pre-Feasibility Assessment'. Given their mandate, the NBBC facilitated an initial review and assessment of ocean ranching as:

1. A potential economic generator for coastal community development; and
2. A promising alternative to fish farms in some coastal British Columbia waters.

The NBBC recognizes that ocean ranching is no panacea, is not for everyone, and is not suitable for every location.

2.0 PROJECT DESCRIPTION

The specific NBBC project objectives were to:

1. Develop a partnership based 'Ocean Ranching Joint Working Paper' as the next step to moving forward from a NBBC Discussion Paper;
2. Assess the business case at the pre-feasibility level and, using the results, develop a multi-purpose ocean ranching 'Power Point' presentation; and
3. Establish a partnership based and NBBC facilitated Ocean Ranching Project Steering Committee to examine all of the factors that bear on the feasibility of ocean ranching in B.C.

3.0 PROJECT JOINT WORKING PAPER

The following addresses Project Objective #1. From a business based perspective at the pre-feasibility level, the purpose of the Ocean Ranching Joint Working Paper was to address the question of the potential importance of a 'made in BC' ocean ranching strategy to the viability of British Columbia coastal communities:

“Considering the Alaskan experience and from the perspective of the interested parties, is ocean ranching a viable and desirable option for British Columbia to which we should devote more time, money and effort - Yes or No?”

To help provide an answer to this question based upon the best available information, the Joint Working Paper provides:

1. An assessment of: the Alaska experience;
2. The British Columbia experience;
3. What was learned from a comparison and contrast assessment; and
4. Project Conclusions and associated Recommendations about what should happen next for each major question and issue reviewed during the pre-feasibility study.

Three key factors were utilized to focus the scope of the project: a definition of 'pre-feasibility'; the framework required for a viable sectoral ocean ranching fishery; and the need to address a basic public policy question as to whether community well being can be linked to a sectoral approach. 'Pre-feasibility assessment' in terms of this Phase II project means asking whether or not a particular initiative, in this case a B.C. ocean ranching strategy, is worth looking at further. It does NOT mean a detailed financial plan.

4.0 AN OCEAN RANCHING CONTEXT

The following provides a context to begin to consider ocean ranching from a BC perspective. Ocean ranching is briefly described, and some important questions are initially addressed including who could benefit, how could it be paid for, how does it differ from other operations such as fish farming, how could success be measured, and what are the critics of ocean ranching saying.

Ocean ranching is a technology, philosophy, and organization of salmon enhancement in Alaska that is intended to supplement the common property harvest of salmon in a way that is ecologically and financially sustainable, and community and stakeholder-based.

A preliminary appraisal suggested these goals might have been quite successful: Wild salmon and ranched salmon in Alaska are both near record highs after 30 years of ocean ranching; fishers and the state appeared to have seen a good return on their investment; the program is run with broad public and fisher support and input; and substantial benefits have flowed to local communities.

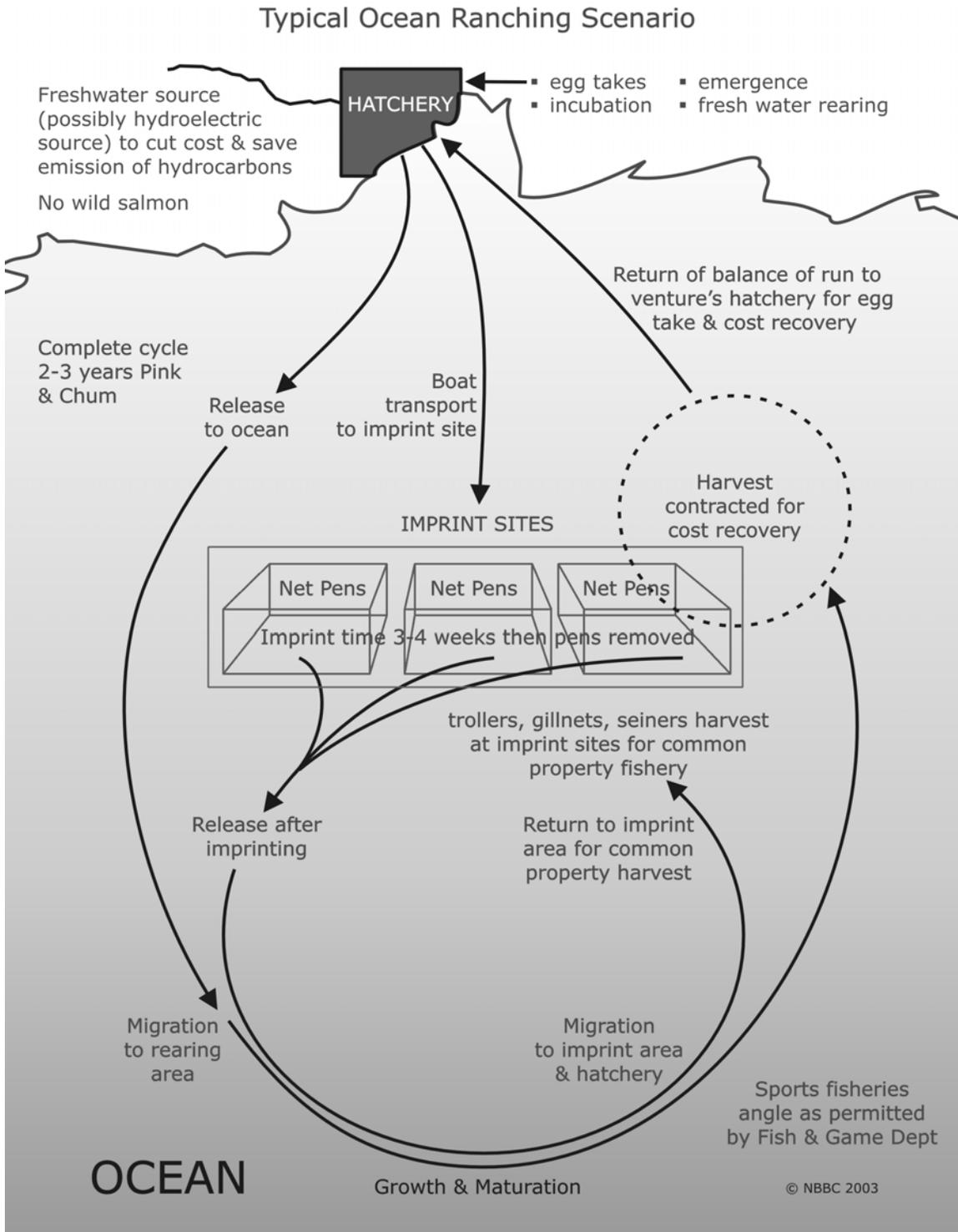
The task of the project was to probe deeper. By way of illustration, Table 1 provides some background information on the regional economic impact of ocean ranching in Southeastern Alaska.

Table 1 Regional economic impact of ocean ranching in Southeastern Alaska, 1990-2000	
Source: McDowell 2001	
Common property commercial harvest of Private non-Profit (PNP) salmon, volume and ex-vessel value	582,000,000 lbs US\$ 200,000,000
--PNP salmon as a % of regional total value	23%
Wholesale (processed) value of PNP salmon	US\$ 737,000,000
Sport harvest of PNP Coho Chinook	408,000 salmon
--PNP Coho & Chinook as % of regional total	11%

4.1 WHAT IS OCEAN RANCHING?

Alaskan ocean ranching is a system of salmon hatcheries that are run and largely funded by Private Non-Profit (PNP) associations of fishery stakeholders. This system operates inside of a State of Alaska regulatory system that maintains a strong priority on the preservation of wild salmon, and ensuring a very significant contribution of ocean ranched salmon to the common property fishery. A basic objective is to ensure that meaningful regional and community benefits flow from ocean ranching. The following diagram (Figure 1) illustrates a typical ocean ranching scenario.

Figure 1



4.2 THE ALASKA EXPERIENCE

The review and evaluation of the Alaska ocean ranching experience is a key element of the pre-feasibility business case assessment of a BC coastal zone ocean ranching strategy. The Joint Working Paper reviews the Alaskan experience in some detail, and provides insights for consideration with respect to its history, the basic structure of the industry, the legislative and regulatory structure, how it is financed and capitalized, the production trends, the economic, social and community benefits, and current market challenges.

This assessment of the results of the Alaska experience suggest that the Alaskans, based upon their more than a quarter century of experience, have identified and addressed to the general satisfaction of their key stakeholders most of the key issues and concerns that are being raised by British Columbians.

4.2.1 History

The desire by Alaskans to control their own fisheries and abolish fish traps was a major motivator for Alaskan Statehood in 1958. Wild salmon harvests continued to plummet to a historic low in 1967, leading the State to consider a hatchery program to increase abundance. But wild salmon habitat and escapement levels were generally healthy, which meant that wild salmon could eventually recover. With this in mind, the State began to design a unique hatchery program that would increase harvests while not impairing the ability of wild salmon to recover and eventually flourish again. Figure 2 illustrates the success to date of the Alaska program with regard to parallel increases in the abundance of both wild and ocean ranched commercial salmon harvests.

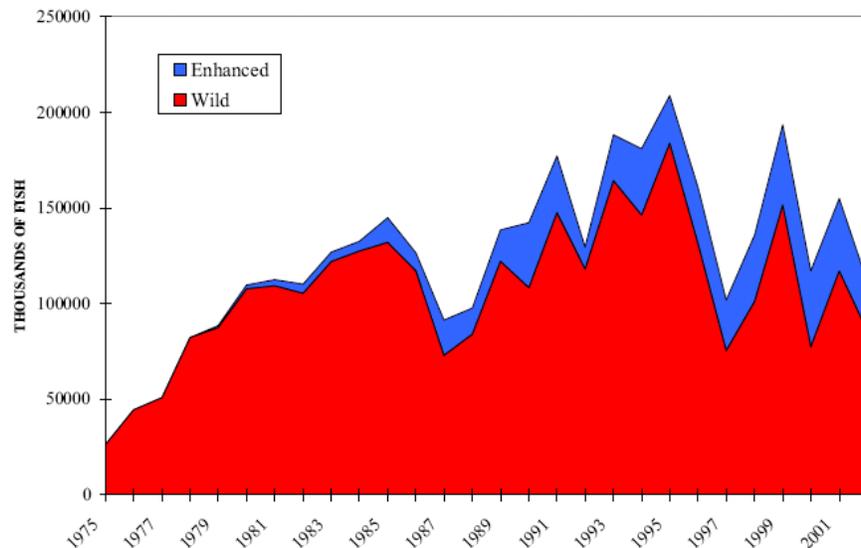


Figure 2 Commercial fishery harvests of wild and enhanced salmon in Alaska, 1975–2002

Source: ADF&G

In 1974 the Alaska Legislature enabled regional and non-regional Private Nonprofits (PNPs) to form and operate salmon ranching hatcheries under the oversight of the Alaskan Department of Fish and Game (ADF&G). Beginning in 1976 the state put \$110 million into a Fisheries Enhancement Revolving Loan Fund, to subsidize the financing that PNPs needed to get off the ground and make it through the first few years. In 1979 the State permitted PNPs to earn revenue from Cost Recovery Harvests.

Ocean ranching was proposed in BC in the early 1980's, but it was rejected. This rejection was based upon the fact that the concept proposed at the time in BC was a fully private model where a profit-earning corporation would have ownership over the salmon it released, leaving commercial and other fishers out of the loop. In contrast, the Alaskans developed a hybrid public/private non-profit/ regional model where hatcheries contribute salmon to the common property fishery and hatcheries are only allowed to earn enough revenue to cover their costs.

Shortly before the PNP program began, Alaska developed a parallel system of State hatcheries. The Fisheries Rehabilitation and Enhancement Division (FRED) of ADF&G was created in 1971 and at its peak it operated 20 hatcheries and streamside incubation facilities. (Its' counterpart in Canada is the Salmonid Enhancement Program of the Department of Fisheries and Oceans.) FRED built and operated hatcheries and performed monitoring and research on salmon fisheries and ocean ranching until its responsibilities were taken over by ADF&G's Division of Commercial Fisheries in 1992, partly in response to declining state oil revenues. Starting in the late 1980's the State began transferring the operation of its hatcheries towards PNPs.

Alaska has banned salmon farming since 1990, somewhat due to wild salmon concerns, and partly to protect the State's investment in the PNP ocean ranching program.

In 2000 the Marine Stewardship Council certified Alaskan salmon fishery management as sustainable. Today both wild and ranched salmon production in Alaska is near record levels.

Table 2 Total Alaska hatchery salmon production, 1966-2003			
Source: ADF&G			
Year	Egg-take '000s	Releases '000s	Returns '000s
1966	NA	1	0
1967	NA	1	0
1968	NA	1	0
1969	NA	1	0
1970	NA	1	0
1971	NA	1	0
1972	NA	2	0
1973	2	0	0
1974	8	2	0
1975	29	7	18
1976	56	9	38
1977	96	38	175
1978	129	73	334
1979	152	85	1,962
1980	292	96	3,024
1981	475	212	4,885
1982	548	331	6,939
1983	548	412	6,560
1984	675	416	6,650
1985	995	659	16,650
1986	1,031	745	12,582
1987	1,274	754	24,994
1988	889	826	15,330
1989	1,418	1,087	34,530
1990	1,603	1,154	47,422
1991	1,634	1,319	46,109
1992	1,725	1,323	23,187
1993	1,685	1,475	32,609
1994	1,758	1,302	55,172
1995	1,913	1,503	38,062
1996	1,687	1,638	49,229
1997	1,734	1,363	50,839
1998	1,776	1,453	56,468
1999	1,791	1,435	71,276
2000	1,762	1,476	62,960
2001	1,792	1,481	61,729
2002	1,862	1,484	49,345
2003	1,927	1,495	80,050
Total	33,265	25,650	859,126

Like in BC, the State of Alaska uses limited entry licenses, gear restrictions, and season openings to manage its fisheries, which are common property fisheries. All 5 species of Pacific Salmon are caught in Alaska. Commercial fishers, sport fishers, and personal use/subsistence fishers are all very active.

Most hatcheries fall under the private non-profit (PNP) program, which is under the oversight of the State regulatory agency. Regional PNP involve fishery stakeholders in their management and funding, and all PNPs are supposed to contribute substantially to the common property fishery, taking as little a portion of the ranched salmon harvest as possible for brood stock (to breed the next generation) and to cover their costs.

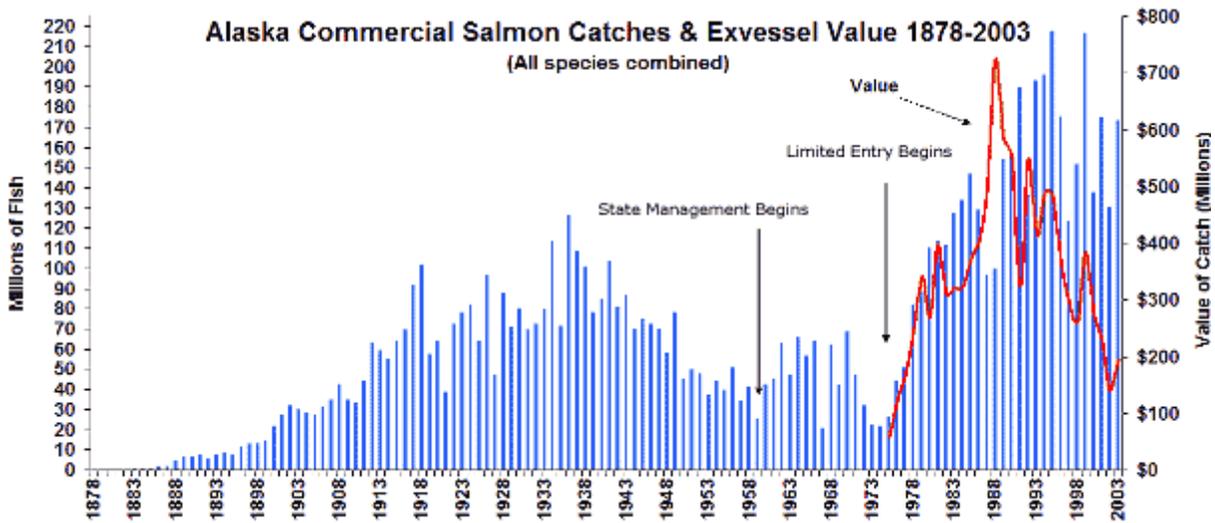


Figure 3 Alaska commercial salmon catches & ex-vessel value, 1878-2003

Source: ADF&G

4.2.2 Production Trends

There are 29 PNP hatcheries in Alaska, 26 of which are active, plus 2 state and 2 federal hatcheries. In 2003, 1.5 billion hatchery salmon were released from 77 different release sites. The 2004 releases will bring total hatchery releases since the program began in the 1970s to 27 billion. Enhanced salmon made up 33% of the common property harvest (which excludes cost recovery) in 2003, or 23% of the ex-vessel value (the amount fishers receive for their catch, not counting mark-ups by processors and distributors). About 73,000,000 out of a total harvest (including cost recovery) of 173,344,000 salmon consisted of hatchery salmon, or 42%. Table 2 (previous page) illustrates total Alaska hatchery salmon production, 1966-2003, and Figure 3 above illustrates Alaska commercial salmon catch and ex-vessel prices, 1878-2003. Interestingly, Figure 3 reveals that the recovery of wild salmon stocks coincided with the growth of the ocean ranching program.

4.3 WHO CAN BENEFIT?

Considerable concern has been and continues to be expressed by coastal communities and a number of other stakeholders in the BC salmon fishery regarding the adverse impact of federal management policies on their economic and social well being. The concentration of commercial licenses is but one example. Stakeholders want to know whether or not ocean ranching would reinforce current negative trends and be restrained by current policies, or whether ocean ranching could reverse or mitigate some of these trends.

With this in mind, a fundamental question for the Steering Committee from a pre-feasibility business case perspective was - 'If an ocean ranching strategy were to be pursued in BC, who could potentially benefit?' Given the initial assessment of the Alaskan experience, the answer to this question could be:

1. Commercial fishers of all gear types who can get increased harvest opportunities and values and longer openings;
2. Sports Fishers;
3. Subsistence and personal use fishers
4. Processors
5. Other businesses can benefit from spin-off activity
6. Communities and governments that get additional tax revenue and whose resident fishers and businesses gain employment and profits

Table 3 Regional economic output (direct and indirect), annual equivalent jobs, and payroll from ocean ranching in Southeastern Alaska, during peak year 2000			
Source: McDowell 2001			
Sector	Econ. Output	Jobs	Payroll
Commercial Harvest	\$42,000,000	411	\$11,000,000
Seafood Processing	\$111,000,000	893	\$25,000,000
Sport Harvest	\$8,000,000	121	\$3,000,000
PNP Operations	\$10,000,000	150	\$4,500,000
Total	\$171,000,000	1,600	\$44,000,000

4.3.1 Economic, Social and Community Benefits

Table 3 above illustrates the regional economic output, annual equivalent jobs, and payroll from ocean ranching in Southeastern Alaska in 2000.

From a basic economic and social perspective, more people can participate in the common property fishery than would have been possible without ocean ranching. They can participate as subsistence, sport and commercial fishers.

Communities, processors, the State, and others also benefit from the expansion of the seafood sector. If one examines the total contribution of all the commercial fisheries to the State economy, it is easy to see the importance of the portion that is due to ocean ranching.

About 20,000 Alaskans are employed in harvesting and processing in the commercial fisheries, and another 15,000 in associated jobs. Salmon fisheries account for about half of those jobs (Eagle et al, in press). If 30-40% of salmon comes from ocean ranching, then one could speculate that ocean ranching might employ around 5,000 people either directly or indirectly.

Most protein consumed by rural Alaskans each year - 375 lbs per person - comes from subsistence activities, and it would cost \$2,000 per person (almost \$300 million State wide) to replace that protein. In some rural areas, commercial fishing is the primary source of cash income, which rural Alaskans use to buy necessities and fund their hunting and fishing subsistence activities. (Eagle et al, in press). All Alaskans are entitled to fish for salmon for personal use.

Table 4 below shows the number of enhanced salmon in the common property harvest in 2003, broken down by commercial gear type, sport fishers, subsistence fishers, and by salmon species.

Table 4 Contribution of enhanced salmon to common property user groups in Alaska in 2003					
Source: ADF&G					
Species	Number of Hatchery Salmon in Common Property Harvest				
	Seine	Gillnet	Troll	Sport	Personal Use/ Subsistence
Pink	39,681,210	0	15,327	33,795	1,343
Chum	4,188,122	1,800,909	269,799	2,083	0
Coho	270,589	165,424	263,012	265,167	10,840
Chinook	7,185	9,532	27,392	33,475	243
Sockeye	751,715	2,435,402	0	14,463	192,195

Table 5 below shows the total amount of ocean ranched salmon of each species that were harvested in each region in 2003 in Alaska.

Table 5 Total returns to Alaska hatcheries and enhancement projects in 2003 by region and species, including common property, cost recovery, broodstock, and escapement							
Source: ADF&G							
Region	Pink	Chum	Coho	Chinook	Sockeye	Other	Total
Southeast	1,302,017	9,675,218	1,095,384	145,313	440,825	140	12,658,897
Prince William Sound	50,576,657	3,529,196	227,403	1,059	1,742,098	0	56,076,413
Cook Inlet	943,512	0	80,081	24,051	1,782,080	135,530	2,965,254
Kodiak/Alaska Peninsula	6,951,906	506,906	160,274	0	866,389	0	8,485,475
Totals	59,774,092	13,711,320	1,563,142	170,423	4,831,392	135,670	80,186,039

4.3.2 Sport Fishers

From 1990-2000, PNPs in the Southeast region of Alaska contributed 330,000 Coho and 78,000 Chinook to the sports fishery, 11% of the total sports harvest of those species in the region, and up to double that in some years (McDowell, 2001). Entire segments of the sports fishing industry have sprung up in areas where there was no sports fishing prior to ocean ranching, and other segments have been strengthened. For instance, the sports fishing season near NSRAA is 4 months instead of 2 months because ocean ranching has added a month for Chinook at one end and a month for Coho at the other end, with obvious benefits to sport fishers and businesses such as lodges that service them.

Table 4 on the previous page includes data on the number of salmon contributed by ocean ranching to the recreational fishing sector.

4.3.3 Commercial fishers

From 1990-2000, PNPs in the Southeast region of Alaska contributed 582 million lbs and US\$200 million in ex-vessel value to common property commercial fishers in the region, 23% of their total. In 2000, the peak year for the value of PNP salmon in the Southeast region of Alaska, the ex-vessel value to commercial fishers of the ranched salmon portion was US\$32 million. This generated \$171 million in economic activity, including 1,500 jobs and wages of \$44 million (McDowell, 2001). Table 6 provides the common property commercial harvest of enhanced fish for 2003.

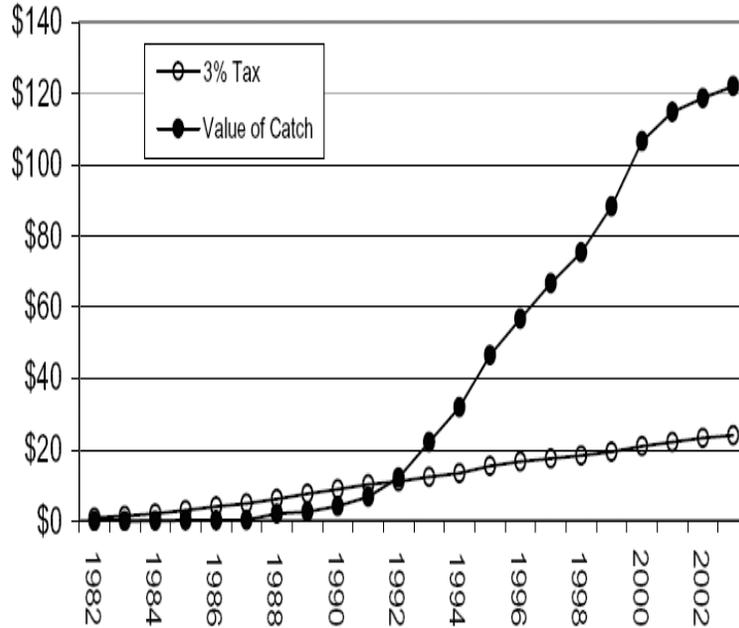
Harvest	Chinook	Sockeye	Coho	Pink	Chum	Total
Commercial Harvest*	599	31,013	4,105	121,696	15,931	173,344
Cost Recovery Harvest	49	604	395	15,447	6,534	23,029
Common Property Harvest	550	30,409	3,710	106,249	9,397	150,315
Enhanced Fish Harvested	44	3,187	699	39,697	6,259	49,886
Enhanced % in Common Property Harvest	8.0%	10.5%	18.8%	37.4%	66.6%	33.2%

*Commercial harvest is fish caught by all commercial gear types, including cost recovery harvested fish
Source: ADF&G

Looking strictly at the return on investment from the perspective of license holding fishers in the regions of PNPs, the payment of the Salmon Enhancement Tax has been profitable. Perhaps the most successful example is the case of NSRAA, shown in Figure 4 on the next page.

Figure 4 Cumulative value of the salmon produced by NSRAA for commercial fishers in the region, compared to the SET tax they contributed, US\$ millions

Source: NSRAA, 2003



Fishers in the Southeast region imposed a voluntary 3% tax in 1981 on the ex-vessel value of their salmon landings (both wild and ranched), to help fund NSRAA ocean ranching. The hope was that this investment would pay off, and it has more than done so. As of 2003 they have paid in US \$24,162,032 (see Table 8 on page 25) and so far ocean ranching by NSRAA alone has boosted the cumulative value of their common property harvest in the region by over \$125 million. That works out to an average annual rate of return of almost 25% (NSRAA 2002).

4.3.4 Communities and Government

Tax revenue: Table 7 on the next page shows the revenue that Alaska collects from fishery related taxes. Some of these taxes go towards general state funding, some are shared with communities, some are transferred to PNPs, and some are earmarked for generic marketing. All of these taxes are paid on both ranched and wild salmon, so a certain portion of each tax can be attributed to the PNP program. The largest revenue earning tax, the Fisheries Business Tax, is shared half-and-half between the state and communities.

Dependence on the seafood sector: Many communities outside of the capital region are heavily dependent on the seafood industry for their tax base, for instance, 29% in Sitka, 38% in Kodiak, and 40% in Ketchikan (RaLonde, 2004). These communities benefit to the extent that ocean ranching boosts the size of the seafood sector in their region.

Alaskan Fishery Related Taxes	FY 03 Total	FY 03 % of Total State Revenue	FY 02 Total	FY 01 Total
Salmon Enhancement Tax(SET) (2-3% of ex-vessel value of all salmon in region)	\$2,422,051	0.2%	3,701,801	3,643,990
Fisheries Business Tax (1-5% of fish value)	\$26,002,713	2.2%	25,292,371	30,494,634
Fishery Resource Landing Tax (1-3% of value of fish processed before landing)	\$9,876,465	0.8%	7,223,775	7,348,739
Seafood Marketing Tax (0.3% of seafood products)	\$2,989,931	0.2%	2,698,456	3,156,843
Salmon Marketing Tax (1% of salmon ex-vessel value)	\$1,412,041	0.1%	1,986,718	2,554,607

Source: Alaska Department of Revenue. FY = Fiscal Year

4.3.6 Processors

PNPs in Southeast Alaska alone contributed 582 million lbs of ranched salmon to the common property fishery from 1990-2000, which was worth \$737 million in first wholesale value to processors, not counting the additional value to processors of the Cost Recovery Harvests (McDowell, 2001).

4.4 HOW IS OCEAN RANCHING DIFFERENT FROM SALMON FARMING AND SEP?

It is important to clearly understand the differences between ocean ranching, salmon farming and BC's Salmonid Enhancement Program (SEP). It is also important to understand that the Alaskans designed their ocean ranching program to contribute significantly to the common property resource, and not as a 'for profit' commercial enterprise. When ocean ranching was first proposed for BC in the 1980's it was on the basis of establishing commercial operations whereby the fish produced would be basically managed as the property of the producer.

This 'for profit' approach was soundly rejected by the British Columbia stakeholders, and has contributed to the fact that ocean ranching has not been seriously considered ever since. This being the case, a key question for the Steering Committee from a pre-feasibility business case perspective was – 'If an ocean ranching strategy were to be pursued in BC, could an approach based upon 'common property' strategy be acceptable to the key stakeholders?' Given the initial assessment of the Alaskan experience, the answer to this question could be based upon following:

1. Ocean ranching is not Salmon Farming: salmon farmers often use non-local species who spend their entire lives in hatcheries and net pens, consuming fish-feed until they reach adult size of typically 4-6 lbs. Ocean ranching on the other hand uses local species, incubates and rears them in hatcheries and net pens for 1-2 years, and feeds them up to only 0.5-30 grams, at which time they are released to migrate and feed in the ocean

like wild salmon for 1-4 years until they return and are harvested. In this regard they may be considered 'free range' salmon.

2. Alaska's system of ocean ranching is run by private nonprofits (PNPs) that are either regional or non-regional. Regional PNPs are essentially cooperatives of fishers. Both regional and non-regional PNPs are mandated to produce ranched salmon primarily for the common property fishery, and can only take a minority share of the ranched salmon harvest to cover their costs, without making a profit.
3. BC's Salmonid Enhancement Program (SEP) was set up and run mainly by the government. It was intended to rebuild wild stocks. Wild stocks were also low at the time of the founding of Alaskan ocean ranching PNPs, but habitat and wild salmon escapements were still healthy. Alaskans knew wild stocks would recover in time, so they designed a system that would increase the total harvest without affecting the ability of wild stocks to rebound. Unlike Alaskan PNP hatcheries, SEP hatcheries are mostly upriver on wild salmon rivers. This is in direct contrast to sites targeted in Alaska that are close to or on salt water and in locations that are designed to minimize potential interaction with wild salmon. Again in contrast to Alaska, SEP do not use Remote Release Sites, an important measure for minimizing interference with wild salmon.

4.5 HOW IS SUCCESS MEASURED?

A key question for the Steering Committee was – *'If an ocean ranching strategy were to be pursued in BC, how should success be measured by a well thought through monitoring and assessment program?'* Given the initial assessment of the Alaskan experience, the answer to this question could be based upon the following.

Unlike hatcheries in other parts of North America, the success of PNP hatcheries in Alaska *is not* measured by how many fish are released, and it is definitely *not* measured by how many hatchery salmon breed in the wild.

Success *is* measured by:

1. Increased ranched salmon harvest opportunities and harvest values for subsistence, commercial and sport fishers in the region;
2. The protection and abundance of wild salmon coexisting with but ideally not breeding or competing with ranched salmon;
3. The financial viability of the ocean ranching organizations; and
4. Other economic activity generated, such as regional employment, profits for processors and sports lodges, and tax revenue for communities and the state.

5.0 PROJECT ASSESSMENT SUMMARY

This section of the report provides a summary assessment framed around several key issues considered strategically important to the prospects for ocean ranching in BC:

1. Awareness and Support;
2. Who Pays;
3. First Nations;
4. Marketing and Prices;
5. Environment and Wild Salmon Protection;
6. Institutional Context; and
7. Pilot Projects.

Several key considerations are kept in mind during the assessment. For a 'made in BC' ocean ranching strategy to be supported and accepted, it has to be:

1. ***Environmentally Acceptable***. There needs to be a low level of risk, but not necessarily 'zero', for the marine environment. Wild salmon protection must be a strict guiding principle;
2. ***Economically viable***. Ocean ranching must be a net benefit for society AND it needs to be able to pay for itself after it is established;
3. ***Socially Worthwhile***. A substantial portion of the benefits must flow to coastal communities, First Nations, and fishery user groups in BC; and
4. ***Politically/Institutionally Feasible***. Ocean ranching would need to be supported and enabled by the stakeholders, the public, and government.

5.1 AWARENESS & SUPPORT

A key element of the pre-feasibility study was to assess and compare the level of awareness of and support for ocean ranching in Alaska and B.C.

5.1.1 Alaska

There is a generally high level of awareness of and support for ocean ranching in Alaska by stakeholders, scientists, regulators, and the general public.

There are, however, critics of the Alaska ocean ranching initiative, although fewer than of other hatchery programs. The Project Steering Committee considered it very important to hear and understand what these criticisms are, and weigh these criticisms in deciding whether ocean ranching poses an opportunity for BC fishing communities that is worth pursuing further:

1. Like anything else that touches on fisheries, there are allocation issues. For instance, it is a challenge to get all the different gear types to feel that the benefits they each receive are exactly proportional to their contribution. Serious dialogue and input from all affected stakeholders in the project design and investment phase are crucial. This way the stakeholders accept the goals and risks inherent in the project. Some arms-length distance between fishery management decision-makers and fishery allocation decision-makers has also been helpful in Alaska. Potential allocation conflicts between directly involved stakeholders and other fishery user groups are best anticipated and negotiated beforehand.
2. Some people have a gut-level feeling against hatcheries in general, a feeling that derives some legitimacy from the appalling contribution of hatcheries in North America indirectly and directly to the loss of many wild stocks and the loss of much wild salmon habitat. However, most Alaskan biologists believe that their unique system takes a radically different approach designed to confront and prevent the mistakes of the past. Their attitude is that hatcheries are a tool that can serve a useful purpose given certain conditions and safeguards. B.C. can learn from and build upon the progressive scientific and institutional practices pioneered in Alaska.
3. Some groups feel that any potential impact at all on wild salmon genetics, however small, is unacceptable, and reject the idea that the level of genetic risk can be low and managed (Trout Unlimited, 2002). Clearly this viewpoint is incompatible with ocean ranching, which aims for a very low but non-zero level of risk, and considers both the costs and the benefits.
4. Some Alaska fishery biologists feel that the termination of the state division devoted solely to salmon enhancement issues has reduced the state's capacity to monitor the potential impact on wild salmon. B.C. would need to be careful to build in meaningful and enduring mechanisms to monitor and respond to potential wild salmon impacts.
5. Some fishers in Alaska worry that ocean ranching production may have grown to the point that it has contributed to lower prices, particularly with respect to Chum. The potential impact if any on the market price of other B.C. salmon should be considered in a feasibility study if the proposed level of production is high. Niche marketing and the careful selection of a species to ocean ranch should be considered.
6. Other Alaskan critics oppose the state's involvement in providing PNPs with loans, or argue that some loans were too generous or should not have been approved. B.C. ocean ranching should be based upon realistic financial projections, and should aim to be self-sustaining, but external start-up funds or loans may be necessary.

5.1.2 British Columbia

With some exceptions, ocean ranching is by and large poorly understood in B.C. by First Nations, governments, other stakeholders and the general public. Key reasons for this include the facts that:

1. Purely private for-profit ocean ranching was rejected by the stakeholders in the 1980's due to a lack of a common property element of the proposed approach, and
2. DFO at the time was adamantly opposed to ocean ranching in principle, and had no interest in linking it to their planning and management processes.

Dialogue with stakeholders during the pre-feasibility study summarized in this document clearly demonstrated, however, that when the potential benefits and costs associated with a 'made in BC' ocean ranching strategy were presented there was considerable interest in 'wanting to know more' and a willingness to participate in a process to explore the merits of such a strategy. In particular, a number of First Nations are eager to propose sites in their traditional territories.

5.1.3 What Did We Learn?

A key finding was the confirmation that there has never been a comprehensive economic, social, or scientific benefit/cost/risk assessment and comparison of ocean ranching with other means of salmon production (including fish farms) that incorporates input from First Nations and the other key parties.

Another key finding was that to develop and implement a BC ocean ranching strategy, support by the key stakeholders and the general public will be necessary. This means that a well thought through communications strategy based upon solid, professional information will be required so that decisions can be made that reflect the best available information. This communications strategy must be developed through a stakeholder partnership.

5.1.4 Where Do We Go From Here?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy, the development and implementation of a long term and carefully phased communications strategy to engage and confirm both stakeholder and public support must be a key element of a viable initiative.

There are three elements of the pre-feasibility study that could provide important building blocks to initially establishing stakeholder support and framing a communications strategy:

1. The Ocean Ranching Project Steering Committee that is comprised of a wide range of stakeholders;

2. The Power Point presentation developed as part of the project; and
3. The information base generated by the project, presented in the background documents *Ocean Ranching: Environmental Frequently Asked Questions* and the *Joint Ocean Ranching: Working Paper*.

In summary, a first phase BC ocean ranching consultation and support confirmation initiative is required that should include, but not be limited to:

1. Undertaking the dialogue required to secure formal endorsement of the Ocean Ranching Project Steering Committee membership at the Board/Executive level;
2. Determining how each of the Steering Committee members will communicate with their constituencies as the feasibility phase of the ocean ranching initiative is implemented;
3. Confirming a pilot project approach to address identified issues and concerns;
4. Engaging some key environmental organizations in the dialogue; and
5. Undertaking dialogue with DFO and the Province to secure the required support; and
6. Determining if a systematic communications strategy, that would include a series of stakeholder coastal zone ocean ranching workshops, should be conducted during the feasibility phase, or whether this communications strategy should be conducted between the time the feasibility study was completed and the launching of pilot projects.

5.2 WHO PAYS?

Implementing a B.C. ocean ranching strategy will require funding and resourcing over a considerable period of time. A key element of the pre-feasibility study was to initially assess the question – ‘If a realistic ocean ranching strategy were to be pursued in BC, who could and should pay for it and how?’

5.2.1 Alaska

The Alaskans dealt with this question through three strategic elements of their ocean ranching program:

5.2.1.1 Commercial Fishers - Salmon Enhancement Tax.

“The willingness of fishers to tax themselves and to contribute volunteer time to enhancement planning (through serving on association boards and committees, and donating labour and equipment to projects) was the ideological engine that won support for the regional enhancement association concept from all quarters. Conservatives perceived this approach as private enterprise; liberals focused on the collective action aspect. The power to sell fish not needed as hatchery brood stock, however, was the main economic engine which made enhancement feasible.”

“regional associations are becoming the predominant institution for enhancement, both because they use fewer public resources and because they have gained credibility with ADF&G and the state over time.”

Source: Pinkerton, 1994

One key element is through a self-imposed tax paid on all the salmon they catch, both wild and ocean ranched;

The Salmon Enhancement Tax (SET) is a major source of funds for regional PNPs. It is a voluntary¹ tax of 2-3% that fishers levy on their salmon sales to fund ocean ranching in their region by a referendum. SET is distributed by the state to the regional PNPs in accordance with the proportion of ocean ranched salmon caught in each region. The tax is on the fishers but for accounting purposes it is collected by the state from Alaskan processors and from fishers who do direct exporting. Cost Recovery Harvests by PNPs are exempt from SET. Non-regional PNPs do not have access to SET.

In the 2003 fiscal year, 186 taxpayers filed 871 returns bringing the total SET collected by the state that year to US\$2,422,051 (down from \$3,701,801 in 2002 and \$3,643,990 in 2001). SET accounts for 0.2-0.3% of Alaska state revenue. The Alaskan Department of Revenue calculated its cost of running the SET program in 2003 to be US \$46,501, or the full-time equivalent of 0.6 of a staff person. Table 8 below shows the SET rate adopted by fishers in each region, as well as the cumulative and annual funds raised.

Regional PNP	SET Rate	FY 04	FY 03	FY 02	FY 01	Cumulative
SSRAA	3%	521,176	560,456	1,329,122	754,475 \$	\$32,292,765
NSRAA	3%	749,220	659,790	874,190	1,193,322	\$24,162,032
CIAA	2%	251,425	244,719	165,972	187,202	\$20,258,785
PWSAC	2%	529,186	559,046	705,283	761,167	\$15,088,373
KIAA	2%	294,159	279,692	451,211	479,706	\$11,994,958
Chignik	2%	87,211	109,035	169,673	260,739	\$3,047,546
Total Tax		2,432,378	2,412,738	3,695,451	3,636,612	
Interest etc.			9,313	6,350	7,378	
Total		2,432,378	2,422,051	3,701,801	3,643,990	\$106,844,460

Why have fishers in several regions chosen to levy this tax on themselves? The answer is simple. It makes sense from a business/financial perspective. The potential return on their investment is substantial as already demonstrated in terms of greater harvest values and opportunities, is discussed in Section 4.3.3 Commercial fishers.

Are there equity issues? Yes. All commercial fishers are net beneficiaries, but some feel they would benefit even more if their gear-type was allocated a higher portion or if non-commercial fishery user groups in the region contributed funding to the PNP. Although all commercial fisher gear types in a PNP region pay the same rate of Salmon Enhancement Tax on the ex-vessel value of their landings, the portion and value of each gear type's harvest that is composed of ocean

¹ Fishers in each region voted on whether or not to impose a tax, and voted on what level of tax. Payment of the tax is compulsory for all salmon fishers in regions that voted in favour of the tax.

ranching salmon can vary across gear types, and it is difficult to manage the fishery and hatchery releases in a way that is consistently fair.

The 1992 Audit of the revolving loan fund recommended against having different SET rates for different gear types, since each gear type is represented on the PNP Board of Directors which tries to plan projects fairly, and the degree of fairness that eventually results is a matter of chance not discrimination, and because all salmon fishers in PNP regions do benefit.

Sports fisheries and subsistence fisheries are major beneficiaries from some PNP programs, but PNPs do not usually have more than one sports fisher or subsistence fisher on their Board of Directors, and PNPs do not receive contributions from sports fishers or lodges through any license fees or self-imposed taxes. Some PNPs do receive some state funding from the Sports fish branch of ADF&G, but this practice is not consistent across PNPs. In general, the sports fishing industry is a large untapped potential source of funding.

For instance, the NSRAA regional PNP makes a major contribution to the regional sports fishery but receives no compensation from the state or the sports fish industry. NSRAA feels this practice is no longer viable in an era of competitive commercial salmon prices, and it is requesting compensation from the sports fish industry. This also illustrates the challenge of asking for compensation for a service that one has historically provided for free. Such compensation is easier to request at the initiation of a program, and any financial contributor will expect appropriate representation on the Board of Directors.

Fortunately for the wild salmon, the bulk of political pressure over salmon allocation issues falls on the independent Board of Fisheries, which allows the ADF&G a freer hand to manage the fishery and protect wild salmon.

5.2.1.2 Private Non-Profit (PNP) Associations - Cost Recovery Harvest.

A second key element related to financing the Alaska system is through PNP's established by fishery stakeholders. Revenue is generated from Cost Recovery Harvests of a portion of returning ranching salmon, and any other additional sources of revenue they can find.

The State of Alaska allows both regional and non-regional PNPs to plan to take a portion of the returning ranching salmon in a Cost Recovery Harvest. The PNP markets its harvest in advance to processors, and harvests the salmon so as to get as much value as possible. Table 9 on the next page shows total PNP production and harvest over the years. So far Cost Recovery Harvests have netted a total value of US\$262.5 million. Some of the harvest is used as broodstock for the next generation of salmon in the hatchery

The State regulatory agency ADF&G retains final authority over the quantity and timing of this harvest in order to maintain a priority on the protection of wild salmon, to ensure a significant portion is harvested by common property fishery users, and to implement the allocation guidelines set out by the Board of Fisheries.

Table 9 below shows the total number of salmon that ocean ranching contributed to the State-wide harvest each year, the number of those in thousands that were taken by hatcheries for cost recovery, and the value of that cost recovery harvest.

Table 9 Total Alaska PNP production and Cost Recovery Harvests and values, 1975-2003					
Year	Egg take (millions)	Fry release (millions)	Total return (thous.)	Cost recovery (thous.)	Cost recovery revenue
1975	8				
1976	17	4			
1977	37	12	160	109	
1978	37	27	161	215	
1979	54	29	357	253	\$272,000
1980	126	36	1,506	346	\$482,000
1981	224	102	2,564	856	\$1,274,640
1982	234	127	5,341	1,364	\$1,170,000
1983	261	170	4,286	886	\$671,000
1984	373	218	4,764	1,043	\$1,655,000
1985	470	302	8,106	1,854	\$1,902,000
1986	522	381	7,904	1,212	\$1,861,000
1987	868	461	19,097	4,184	\$6,562,000
1988	1,046	820	14,344	2,498	\$8,789,000
1989	1,109	860	24,045	15,012	\$16,611,000
1990	1,249	925	42,405	10,388	\$12,898,000
1991	1,326	1,087	40,265	13,170	\$6,317,000
1992	1,428	1,075	18,175	7,255	\$10,239,000
1993	1,613	1,426	27,781	4,848	\$7,340,000
1994	1,726	1,268	52,023	15,906	\$17,104,000
1995	1,877	1,174	37,593	9,554	\$12,924,000
1996	1,735	1,632	48,946	14,657	\$14,325,000
1997	1,713	1,349	50,629	19,352	\$16,111,000
1998	1,759	1,444	56,154	15,651	\$14,535,000
1999	1,778	1,428	71,140	22,608	\$21,759,078
2000	1,750	1,469	62,743	19,007	\$26,065,000
2001	1,779	1,473	59,885	18,398	\$22,196,000
2002	1,849	1,478	49,061	19,004	\$19,462,990
2003	1,914	1,491	79,847	23,029	\$19,999,879
Cumulative Hatchery Revenues from Cost Recovery Harvests:					\$262,525,587
Source: ADF&G					

How does the harvest work? PNP hatcheries typically incubate and rear salmon using a non-anadromous stream (a stream with no wild salmon) as its fresh water source. The salmon are then kept in a net pen for 1-2 months where the stream meets the ocean. This allows the salmon fry or smolts to grow and imprint the chemical composition of that stream and causing them to return home

to that exact area 1 or more years in the future when they are sexually mature. Ranched salmon that are not caught by fishers along the way will return to the site where they were released.

Typically this site allows for a 'terminal harvest', where ranched salmon can be harvested away from wild salmon, for instance away from wild salmon migration routes in an inlet or bay where there are no wild salmon streams.

Rather than only release salmon in front of the hatchery, PNPs usually also keep a portion of the fry or smolt in net pens at Remote Release Sites with similar desirable characteristics. This practice allows for Cost Recovery Harvests at more than one location, and it provides targeted harvest opportunities to certain common property fishery user groups along the migration route to that release site. A bonus from the use of one or more Remote Release Sites is to help diversify the PNP's portfolio and buffer it against variable returns to each site.

Given Alaska's constitutional imperative to maintain the common property nature of the fishery, the Board of Fisheries published these goals:

1. Regional PNPs should aim to contribute at least 70% of returning ranched salmon to the common property fishery.
2. Non-regional PNPs (who do not have access to revenue from the Salmon Enhancement Tax) should aim for a figure of at least 60%.

The statewide average over the past decade for all PNPs, both regional and non-regional, is that 66% of ranched salmon went towards the common property fishery. Some PNPs are below target and others are above target.

For instance Douglas Island Pink & Chum Corporation (DIPAC), a non-regional PNP with a large debt has averaged a contribution of 40% of its ranched salmon towards the common property fishery over the past decade (below the goal of 60%). Although DIPAC is meeting its debt payments, the long term repayment of its debt may require continuing to take a large share of the harvest for cost recovery.

NSRAA, a regional PNP with no remaining debt, has averaged a contribution of 86% of its ranched salmon towards the common property fishery over the past decade (significantly above the goal for regional PNPs of 70%).

If the market price of salmon falls, assuming the total harvest quantity is the same, then the amount of revenue that can be earned from a given level of Cost Recovery Harvest or Salmon Enhancement Tax falls. However the operating costs of the hatcheries are unaffected, so the shortfall in revenue must be made up somehow.

One option is to increase the Cost Recovery Harvest as a portion of total harvest. NSRAA has found that in order to cover its costs in 2004 it needs to reduce its

common property contribution from 86% back to the minimum goal of 70%, but the PNP however, refuses to reduce its contribution further than that. It is experimenting with innovations in terminal harvest methods, processing, and marketing, as alternative ways to increase the value of its terminal harvest.

Fishers in PNP regions are always toying with ideas to juggle revenue sources to make the PNPs more efficient and fishing more profitable. After all, if either the Salmon Enhancement Tax or the Cost Recovery Harvest is a more efficient way to gather revenue than the other, then why use both, why not just use the more efficient?

In the case of NSRAA, if the PNP were to rely entirely upon SET and reduce its Cost Recovery Harvest to just enough to meet broodstock needs, then it would have to raise the SET rate for the region from 3% to at least 15%. It would be difficult to gain acceptance for such a hike, and having such widely different SET rates between regions could give fishers an incentive to conceal the true source of their salmon harvest.

At the other extreme, commercial fisher Blough (NSRAA, 2004) observes that the price received by NSRAA for salmon in its Cost Recovery Harvest in recent years was about 30% higher than the price received by ordinary commercial fishers in the region (due to quality and marketing). He suggests that NSRAA harvest 100% of the returning ranched salmon, and distribute all resulting profits in the form of an annual dividend to commercial license holders in the region. This proposal, however efficient it might be, would be a controversial departure from traditional ways of organizing the common property fishery, and would neglect other important goals such as contributing to subsistence and sport fishing.

Interestingly, having any Cost Recovery Harvest at all, that is performed by a nonprofit organization that is mainly contributing to the common property fishery, bears important resemblance to a fisher's cooperative. By fishing cooperatively rather than competitively in the Cost Recovery Harvest, harvesting can be more efficient and quality-oriented, which lowers the cost of fisheries enhancement, and benefits the common property fishers who pay for that enhancement.

5.2.1.3 Grants, Subsidies, Renting, Tourism, and Subcontracting

Like many other industries, PNPs are occasionally eligible for regional economic development grants from the state or federal government if the PNP can put together a good project proposal that would positively impact employment and the economy, or if the PNP is experimenting with a new marketing approach or technology that the government wants to promote.

In some places the state or federal government will contract a PNP to produce salmon for a particular sports fishery or to enhance a wild run. Some PNPs barely recover their costs from such contracts, other contracts are inflated and

amount to a subsidy to the PNP, and some PNPs produce salmon for certain fisheries even though the user group which harvests in that fishery does not pay any compensation.

DIPAC, a non-regional PNP located near the city of Juneau, a major tourist destination, earns about US\$250,000 per year from its hatchery Visitor Centre, and from renting facilities to a local university for research.

5.2.1.3 The State of Alaska – Revolving Loan Fund.

Alaska helped get the PNP program going with a large Revolving Loan Fund (about half repaid so far), and it later leased many State-constructed hatcheries to PNPs.

Since the fund was established in 1976, US\$110.5 million has been loaned out, and as of 2001 \$51.7 million had been repaid. Loans do not accumulate interest or require repayment for the first 6-10 years. The interest rate was 9.5% up until 2003 when it changed to about 5.5%. In 2003, three PNPs took out new capital loans and two took out new operating loans.

Table 10 below shows how much each regional and non-regional PNP has borrowed for capital or operating purposes, and how much each has paid back so far.

Table 10 Cumulative Capital and Operating Loans to PNPs				
PNPs (number of permits)		State Loans Cumulative up to FY 2003		Total Repayments as of FY 2001
		For Capital Construction	For Operations	
Regional	SSRAA(4)	\$9,693,000	\$4,492,309	\$18,061,783
	NSRAA(3)	\$2,724,265	\$1,816,496	\$5,963,695
	CIAA(3)	\$1,576,381	\$2,982,600	\$1,793,636
	KRAA(2)	0	0	0
	CRAA(0)	0	0	0
	PWSAC(3)	\$24,475,419	\$5,585,500	\$10,354,661
Regional PNPs subtotal		\$38,469,065	\$14,876,905	\$36,175,776
Non-Regional	POWHA(1)	\$400,000	\$1,469,000	0
	KTHC(1)	0	0	0
	AKI(1)	\$3,565,145	\$4,087,595	\$2,374,612
	BCF(1)	\$143,500	\$290,875	\$492,844
	DIPAC(3)	\$9,364,000	\$13,664,000	\$4,099,305
	KNFC(1)	\$2,858,724	\$6,128,883	\$56,616
	SJC(1)	\$423,624	0	\$429,743
	VFDA(1)	\$5,046,443	\$8,024,246	\$8,111,369
PGHC(1)	\$1,106,500	\$635,155	0	
Non-regional PNPs subtotal		\$22,907,936	\$34,299,754	\$15,564,489
State Totals		\$61,377,001	\$49,176,658	\$51,740,265

Source: Alaska Division of Investments, and ADF&G. FY = Fiscal Year.

Typical reasons for taking out capital loans include: hatchery construction, expansion and upgrading; staff residence construction; power plan construction; and purchasing items such as net pens, incubators, and property.

Typical reasons for operating loans include broodstock development and covering shortfalls in an usually low-revenue year before financial reserves have been built up. Revenue from cost recovery harvests is typically not available until at least 2 years after the hatchery has been constructed, allowing time for broodstock to be acquired, raised and released. Revenue from the Cost Recovery Harvest may be too low (due to prices or returns) some years, and the PNP may not yet have built up a large enough reserve fund to cover operating costs in a bad year.

The largest PNP in Southeastern Alaska, NSRAA (2002) judges that part of the reason it has been able to pay off its debt already is that it had a financially conservative Board, at least early on, that made tough decisions and made large repayments when times were good. At one point, NSRAA chose to walk away from a newly constructed hatchery when it discovered that the quality of the returning fish was insufficient to make the hatchery viable, a painful decision that NSRAA does not regret, but that other PNPs may not have learned from.

In the early days of the loan fund, it was too easy to get a loan from the fund: optimistic estimates of prices and salmon return rates were accepted and encouraged. If the fund had been more hard-nosed and diligent early on, it is possible that the ocean ranching program today would be somewhat smaller but that the loan fund would be better performing and more PNPs would be viable. But even as it stands, the Fisheries Enhancement Revolving Loan Fund is Alaska's best performing revolving loan fund.

5.2.1.4 The State of Alaska – Leasing of State Owned Hatcheries.

When the PNP program started the PNPs built their own hatcheries, However beginning in 1988 Alaska moved to offload or close all of its publicly owned hatcheries (except for 2 that serve the sports fishery). It had spent about US\$119 million (from bonds and interest) setting up its enhancement program and constructing hatcheries (ADLA 1997). The state is currently working to resolve legal barriers in the way of transferring full ownership and liability to the PNPs, which currently lease and operate the hatcheries (and sites and hydro plants). This leasing arrangement has saved some PNPs millions of dollars in capital expenditures.

However the leasing arrangements are not entirely a 'free lunch': state hatcheries were not always built efficiently in proper locations with adequate production and cost recovery goals in mind, so they are sometimes more expensive to operate than if they had been built by a PNP, if they would have been built there at all. In such cases, when a PNP agrees to operate the formerly public hatchery, it does

so with a state subsidy or because the PNP's Board of Directors judges that their region would be worse off if the hatchery were allowed to close.

5.2.2 British Columbia

At present there is no formally recognized British Columbia ocean ranching program.

What is currently in place is a Canadian taxpayer funded Salmonid Enhancement Program (SEP) operated by the Department of Fisheries and Oceans (DFO) that differs from ocean ranching in three ways:

1. It is mainly not co-managed by community and fishery stakeholders,
2. It is not designed to be financially self-sustaining, and
3. It is not designed to keep hatchery salmon separate from wild salmon.

DFO's interest in continuing to support SEP at current funding levels is declining significantly due to benefit/cost considerations and reduced DFO budgets. Given resourcing considerations, there has been discussion of implementing some form of a 'cost recovery' approach through contributions from fishery users who benefit from SEP projects.

Peter Pearse's *'Turning The Tide'* 1982 recommendation that in B.C. *'Royalties should be applied to all future landings of salmon -----'*, which would be one way of achieving cost recovery / user pay, has not been implemented by DFO as originally proposed.

If it is agreed that ocean ranching should proceed, answering the question of 'who pays' will be complex and likely controversial. The solution may depend on who the expected beneficiaries would be given a particular proposed project site and design.

5.2.3 What Did We Learn?

Neglecting the 'who pays' question could be a 'show stopper'. The context for addressing the 'who pays' question is that ocean ranching operations:

1. Are capital intensive;
2. Require large up-front investments;
3. Need extensive planning beforehand, such as finding a suitable site, doing market research, and getting a permit;
4. It takes several years at a minimum before cash starts flowing in depending on the species and rearing strategy; and

5. Involve risks in terms of production and prices.

Ocean ranching requires patient investors who can envision the benefits on the horizon, and who are willing to wait years before achieving them. Asking fishery stakeholders to contribute funds for a service they already get for free would probably be a non-starter. There could be strong interest, however, in funding a new or expanded fish production and harvest initiative if stakeholders could see a credible analysis showing the benefits outweighing the costs of their investment. A key question will be how to provide financial contributors/investors with a level of security required to make investment decisions.

There are several possible funding methods that could be explored singly or in combination to address the issue from a 'made in B.C.' perspective:

1. ***Royalties/Landing Tax Chosen By Area Licensed Commercial Fishers.*** Alaska commercial fishers in several regions voted to pay a self imposed tax on their salmon landings that goes to fund ocean ranching in the regions where the salmon were caught. Alaska commercial fishers continue to pay their landing tax because they have seen a return on their investment in ocean ranching. B.C. commercial fishers may be interested in this option if the extra harvest opportunities and values they received would be greater than the tax they paid;
2. ***Sport Fishing License Fees Or A Contribution From The Sport Fishing Industry.*** It may be beneficial for licensed sport fishers, and/or the sports fishing industry in a region such as lodge owners and tour operators, to invest in an ocean ranching project that would increase sport fishing opportunities and enable the supporting industry to expand. This could take the form of a contribution from license fees for that region, or some form of contribution from a sport fishing industry association in the region. In exchange, the ocean ranching project could rear salmon species that sports fishers want to catch, and imprint the salmon at specially chosen release sites so that sports fishers would have an opportunity to catch them along the returning migratory route;
3. ***Private Non-Profit (PNP) Associations of Stakeholders.*** Adapted to a B.C. context, this element of the Alaska model could provide the potential to cover a share of the costs associated with ocean ranching. This could be achieved through the sale of a portion of returning ranched salmon, called a 'Cost Recovery Harvest', which the PNP could contract commercial fishers to harvest. In order for a Cost Recovery Harvest to be a reliable funding tool, DFO would need to manage the fishery with input from stakeholders in such a way as to ensure that an adequate portion of the returning ranched salmon would pass through the common property fishery (sport, commercial and subsistence) to reach the 'Terminal Harvest' area of the ocean ranching operation;

4. ***Contracts or Investments Involving Processors.*** The Cost Recovery Harvest described above could be tendered to the highest bidding processor each year as in Alaska, or a longer term agreement could be made with one or more specific processing companies. It may also be possible to involve processors as direct investor partners. For a processor to be interested in investing as a stakeholder in ocean ranching, it would likely desire (a) a share of the profits (if a for-profit model is chosen like the one below), and/or (b) some form of guarantee of access to purchase a portion of the ranched harvest either from commercial fishers or from the Cost Recovery Harvest;
5. ***For-Profit Joint Venture Corporations of Stakeholders.*** Provided there was a major 'common property' component (benefits to commercial, sport or subsistence fishers), a for-profit model might be politically acceptable. Establishing joint venture business partnerships between First Nations and the private sector has the potential of providing investment for the required ocean ranching capital and operating funds;
6. ***Revolving Loan Fund.*** The State of Alaska helped get its ocean ranching program going with such a fund. A revolving loan fund could be utilized to provide the necessary long term financing and capitalization;
7. ***First Nation Development Corporation.*** A First Nation based B.C. fisheries and marine resource economic development corporation could be established with one of its objectives being to provide the financing and capitalization necessary for ocean ranching initiatives to get off the ground and create jobs and benefits for communities. Alternatively, existing First Nations financial institutions could be approached;
8. ***Adapting Suitable SEP Hatcheries To An Ocean Ranching Model.*** Building upon an existing facility would give ocean ranching a head start in many areas, such as, for example, expertise, capital equipment, and broodstock development. However, it is possible that only some, and perhaps none, of the existing SEP hatcheries might be suitable. Candidate hatcheries would need to be economically viable, they would need to be in an area where it would be possible to protect wild salmon, and DFO's permission would be necessary for every step including the involvement of stakeholders in co-management of the facility; and
9. ***Philanthropic Donors Of Land Or Start-Up Funds.*** An individual or community in a position to give land or funds may feel that contributing to ocean ranching would be a useful legacy to benefit, for instance, sport fishing or coastal community development.

5.2.4 Where Do We Go From Here?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy, financing and capitalization must be a key element of the next phase. This should include the assessment of several models, including, private

non-profit, and for profit joint ventures. With this in mind, there are several logical next steps that could be done through a feasibility level study:

1. Develop a benefit/cost assessment related to the question of royalties/landing taxes, and enter into a dialogue with commercial and recreational fishers to determine if such an approach would be acceptable in-principle;
2. Review and assess the possible economic viability of private non-profit associations in cooperation with First Nation and other coastal communities;
3. Review and assess the potential support for and economic viability of for profit-joint venture ocean ranching operations with interested First Nations and the private sector;
4. Review and assess the possible merits of a revolving loan fund from a business case perspective, and enter into a dialogue with appropriate federal and provincial agencies. Precedents have been set, for example, with a Native Fishing Association administered licensing fund; and
5. Review and assess the possible merits of a B.C. fisheries and marine resource economic development corporation from a business case perspective, and enter into a dialogue with appropriate federal and provincial agencies. Such a corporation could, for example, become a key vehicle to help meet Prime Minister Paul Martin's objective to reduce western alienation in general and facilitate First Nation economic development in particular.

5.3 FIRST NATIONS

Considering the potential to create benefits for First Nations and coastal communities is a key NBBC goal. There are, however, several other important reasons to explicitly consider First Nations involvement in BC ocean ranching:

1. The geographic location of First Nations communities along the coast;
2. The employment of Natives alongside non-Natives in the commercial fishery and other fishery related businesses;
3. The shadow of treaty negotiations hanging over BC fisheries;
4. The evolution through Courts of unique First Nations fishery rights in BC as summarized by this quote:

The Courts have interpreted section 35 Aboriginal rights and Crown obligations sufficiently to lay the foundation for

Aboriginal participation in the management, allocation and protection of the fishery resources.²

A key element of the pre-feasibility study was to initially assess the question - If an ocean ranching strategy were to be pursued in BC, would First Nations be prepared to participate, and, if so, on what basis? Without a satisfactory answer to the First Nation question, it could be another 'show stopper'.

5.3.1 Alaska

First Nations in Alaska make up about half of the rural population. Subsistence fishing rights for rural and urban inhabitants are still evolving. As for the commercial fishery, First Nations are integrated with the rest of the fleet. Land claims were mostly settled in 1971, three years before the passage of the Private Non-Profit (PNP) Act that enabled regional fisher's cooperatives to initiate ocean ranching.

Alaska is largely free of the uncertainty brought on by treaty negotiations. From a 'big picture' perspective, overall there is not much separate treatment for First Nations fishers. Exceptions include two First Nations hatcheries operated by the Federal Bureau of Indians separately from Alaska's ocean ranching program. In some instances there are specific spaces on the Board of Directors of ocean ranching operations that are reserved for a member of a First Nations community or First Nations corporation. In the case of the Northern Southeastern Regional Aquaculture Association (NSRAA), who is a First Nation person, is serving as the current Executive Director.

5.3.2 British Columbia

By history, tradition and law, First Nations have been, are and will continue to be intimately involved in all aspects of British Columbia fisheries. With regard to a 'made in B.C.' ocean ranching, First Nations must be a key player. The rationale for this includes, but is not limited to the following:

1. ***Rights Based Fishing.*** The supreme Court of Canada has interpreted Section 35 of the Constitution Act of 1982 to guarantee First Nations a right to fish for "food, social and ceremonial purposes", after conservation needs have been met, although the right has not been clearly defined. The right applies to specific First Nations who can demonstrate to the Courts that salmon fishing is an "integral part of their distinctive culture". Section 35 rights has priority over all commercial and sport fishing. Currently salmon caught under Section 35 cannot be sold, but herring can;
2. ***Commercial Fishing Pilot Agreements.*** A controversial 'right' to a First Nations-only commercial harvest implemented through DFO pilot sales has been challenged in the Courts since 1992, and will likely end up in the

² Gaertner, B. March 2004. The Scope of Section 35 Fishery Rights: A Legal Overview and Analysis. Prepared for the First Nations Panel on Fisheries.

Supreme Court of Canada. From the perspective of the First Nations involved the program fits with their needs and their history, but to some non-native commercial fishers it appears as a 'race-based' erosion of their livelihood. Several treaties currently under negotiation include 'Harvest Agreements' that would allocate a percentage of the commercial harvest to First Nations, a trend endorsed by the recent Pearse-McRae Task Force;

3. **Commercial Fishing.** Natives also participate in the regular commercial fishery alongside non-Natives. In the commercial salmon fishery Natives own or lease about one-third of the boats and licenses. In the past decade total direct employment in the commercial salmon fishery has fallen by more than half, and Natives have been particularly impacted by vessel and license buy-back programs. This in turn has contributed to a decline in the economic viability of coastal and First Nations communities;
4. **New Fishery Related Businesses.** Some First Nations are also considering or have already begun branching out into providing services such as tours for sports fishers and whale watching;
5. **Land.** Some candidate ocean ranching sites may be located on territory that is owned or claimed by First Nations;
6. **Treaties And Uncertainty.** Considerable uncertainty remains around the relationship between common property rights and aboriginal rights, and this will likely be the situation for the foreseeable future, except where treaties have already been finalized;
7. **Fish Farming.** The issue of salmon farms is divisive within and between First Nations. Some are defending the employment benefits, and others are expressing concerns about the potential impact on the environment. Many First Nations are interested in exploring marine-based economic development opportunities that are an alternative to fish farming, such as shellfish aquaculture or ocean ranching;
8. **Conservation And Beyond.** With regard to salmon, First Nations see themselves as stewards. This means that the salmon resource must be managed in a sustainable way, with ensured protection of wild salmon. They also insist that they share in the management. Going beyond conservation, First Nations would like healthy stocks that are large enough to meet Section 35 needs, to create opportunities for commercial harvests, and to allow for an expansion of fishery related business ventures; and
9. **Lack Of Co-management Of The Salmon Fishery.** Currently First Nations wish to be more directly involved in all elements associated with the co-management of the salmon fishery and stock building programs. The Courts have assigned the Government of Canada a 'duty to consult' First Nations on issues that affect their rights, but DFO has not yet chosen to go further than consultation by adopting a co-management model for

the salmon fishery. Similarly, the Salmon Enhancement Program exists under DFO management, although day-to-day operations are often sub-contracted to First Nations. Co-management is already in place for several other fisheries, and there may be some movement in that direction for salmon. The recent creation of the Commercial Salmon Advisory Board and Area Harvest Committees, with representation from commercial and Native fishers, is viewed by some as an encouraging development.

5.3.3 What Did We Learn?

The decline of a number of wild salmon stocks and the corresponding decline in fishing activity by Native salmon fishers is a critical issue of concern to coastal BC First Nations.

1. **Interest.** There is every indication that First Nations are very interested in the kinds of benefits that ocean ranching could provide to individuals and communities in terms of employment, Section 35 fish, commercial harvest opportunities, and co-management of the fishery resource. Informal dialogue confirmed that many coastal First Nations: are aware of ocean ranching, have identified possible locations in their traditional territories, are increasingly frustrated with current DFO policies regarding ocean ranching, are interested in a process to move the approach ahead, and want more information.
2. **Co-management And Incentives.** First Nations would like to engage in co-management of the fishery resource with the government and other fishery stakeholders. In addition, First Nations aspire to some share of any increased fish production they help to achieve. This share would be an incentive to conserve and rebuild stocks or create new stocks, and it would help to pay for ocean ranching costs. This share could also help to finance other development and management work in the area.
3. **Potential Treaty Tie-in.** Depending on the specific location and the stakeholders involved, it is conceivable that ocean ranching might contribute to treaty negotiation by easing up pressure over allocation issues and creating win-win solution rather than zero-sum solutions. It might be easier to divide up the fishery pie if the pie is growing at the same time.

The principles upon which such agreements could be based have in fact been agreed to in Nisga'a treaty. With regard to enhancement: *'The Nisga'a Lisims Government may conduct enhancement initiatives for Nass salmon or Nass steelhead only with the approval of the Minister. This approval will include provisions in respect of the determination of surpluses resulting from an approved enhancement initiative. The Joint Management Committee may make recommendations in respect of those initiatives and provisions.'*

5.3.4 Where Do We Go From Here?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy, the development of a strategy to address First Nation interests must be a key element of the feasibility study. Given the complexity of the issues, the fact that there are 70 or more coastal First Nations, and there are indications that most if not all of them could be interested in ocean ranching, considerable care must be given to ensure that a carefully phased and targeted strategy is put in place.

The key issue is one of structuring ownership and benefits and how do FN fit as stakeholders – as fishermen and as communities. A specific consultation with a selected group(s) during the feasibility study could yield some useful data that will feed into the pilot design and have an impact on stakeholder definition.

Section 5.1.4 suggests that the development and implementation of a long term and carefully phased communications strategy will be required to engage and confirm both stakeholder and public support must be a key element of a viable initiative. A key element of this will be determining how each of the Steering Committee members will communicate with their constituencies as the feasibility phase of the ocean ranching initiative is implemented. With regard to First Nations, it is proposed that the NBBC be the 'steward' for this task.

With this in mind, there are several logical next steps that could be achieved through a feasibility level study. From a strategic perspective, through a NBBC facilitated dialogue with a First Nations group or groups the following questions should be asked:

1. What is the level of support for ocean ranching, and under what terms and conditions?;
2. How would First Nations consider a BC ocean ranching strategy in terms of addressing food, ceremonial, social and commercial needs?;
3. How should the recent Haida court decision requiring meaningful consultations with First Nations on resource management and development issues be interpreted with respect to ocean ranching?;
4. What are the human resource capacity gaps related to an ocean ranching strategy, where are they, and how can these requirements best be addressed?;
5. How do they envision Aboriginal subsistence fisheries co-existing with other resource users? For example, a basic underlying principle of any ocean ranching strategy is that it should be able to pay for itself. If fishery user groups such as commercial or sport fishers contribute, then they would need access to enough of the returning ranched salmon to meet

their requirements from a benefit/cost perspective. The facility would need access to a portion of the run to recover some costs and collect broodstock for the next generation. But even if Native subsistence fishers cannot contribute financially to the program, a way should be found to ensure that subsistence fishers can benefit from some of the returning ranched salmon. This could be one of the social goals of ocean ranching. So the availability of excess salmon for subsistence fishers, and the proximity of subsistence fishers, should be considered in any ocean ranching proposal;

6. How would the NBBC best frame and conduct the dialogue with a First Nations group? The Power Point presentation developed as part of the pre-feasibility study should be used to enter into a coast-wide dialogue with First Nations, backed up by the large information base contained in the main report. In addition, continue to work with (a) the Project Steering Committee that is comprised of a wide range of stakeholders, and (b) other First Nations fishing organizations. As a framework to facilitate the dialogue, the NBBC, the Native Fishing Association, the Aboriginal Fishing Vessel Owners Association, and the Northern Native Fishing Corporation have signed a Letter of Understanding stating a shared objective to ensure optimum First Nation participation in a viable 21st Century fishery for all commercial species of finfish and other marine resources.

5.4 MARKETING AND PRICES

Low salmon prices brought on largely by the global growth of farmed salmon production are a primary cause of the current plight of fishers, fishing communities, and processors. The current salmon market situation raises a basic question about the ability of 'made in BC' ocean ranching initiative to be economically viable.

With this in mind and at a pre-feasibility level, key questions addressed by the pre-feasibility study were - 'How have low prices affected the Alaska salmon fishery and ocean ranching program, how are they dealing with the problem, and what are the implications for ocean ranching in B.C.?'

Figure 5 below reveals the downward trend in salmon prices.

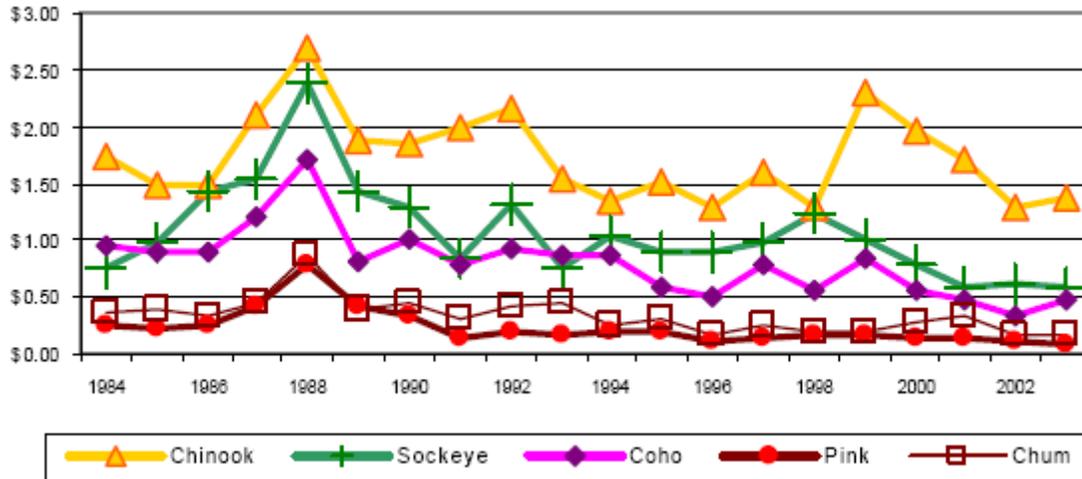


Figure 5 Average Exvessel Salmon Price/Pound By Species

Source: ADF&G

5.4.1 Alaska

The Alaskans are dealing with the marketing and price question through several strategic approaches:

1. **Shift From A Producer-Driven To A Market-Driven Industry.** Alaska used to be such a dominant source of wild salmon that commercial fishers and processors could afford to be careless about quality and what the market wanted. Low harvest years would tend to drive up prices which compensated fishers. Fish farming, however, has raised the standards for quality and efficiency for the whole industry. Now salmon markets are international, prices are much lower, and Alaska is a relatively smaller player. These facts are gradually forcing a fundamental shift in the Alaska salmon industry from being producer-driven to market-driven;
2. **Generic Marketing And Identical Treatment of Wild And Ranched Salmon.** Alaska has a well-funded generic marketing program that promotes the consumption of all wild Alaska salmon, and no distinction is made between ranched and wild salmon in the generic marketing or the labelling of the product itself. Several (but not all) regional salmon branding campaigns have been successful;
3. **Processing And Identical Treatment Of Commercially Caught Wild And Ranched Salmon.** Ranched salmon caught by commercial fishers along with wild salmon are treated the same by processors, and ranched salmon earn the same price as corresponding wild salmon that share the same characteristics. There is the usual considerable variety of size, quality and other market and price influencing characteristics between and within stocks of both wild and ranched salmon;

4. **'Cost Recovery Harvest' Methods In 'Terminal Harvest Areas'**. Where ranched salmon are treated differently is in the *Terminal Harvest Areas* of ocean ranching operations. This is the final destination of a portion of the ranched salmon where they are harvested by the ocean ranching association in isolation from wild salmon in order to recover some costs. Commercial fishers may be sub-contracted to conduct this harvest, but it is organized in a more efficient way than the commercial fishery as a whole. Some ocean ranching operations are currently experimenting with methods to further boost the quality of salmon from the Terminal Harvests. This Cost Recovery Harvest is marketed in advance to processors, which may or may not lead to a premium price depending on factors such as market timing, quality, and the organizations track record of living up to past contracts;
5. **Diversification Of Ocean Ranching Operations**. Besides improved and innovative harvest methods, some of the more successful ocean ranching operations in Alaska are becoming much more diversified. This diversification includes, for example, moving toward chinook and coho production, selling salmon related products such as roe, marketing multiple species, and improved harvest strategies at different locations; and
6. **Sustainability Certification**. The Marine Stewardship Council, an independent certification body initially founded by the World Wildlife Federation and a food company called Unilever, certified that the Alaskan salmon fishery is sustainable, including the ocean ranching program. Alaskan salmon marketers have exploited this certification.

5.4.2 British Columbia

Like Alaska, BC has been hit hard by falling prices, rising quality standards, and the need to shift to a market-oriented industry. Other factors influencing price and marketing include:

1. **Small Scale Generic Marketing**. Generic marketing of wild BC salmon exists on a much smaller scale in BC than in Alaska. Similar to the case in Alaska, salmon from government hatcheries are marketed as wild salmon, unlike farmed salmon which are often distinctly labelled;
2. **Certification**. BC salmon are not currently certified as having sustainable management, but it is in the process of review;
3. **Counterproductive Anti-Fish Farm Propaganda**. Many analysts consider the prevalence of anti-fish farm propaganda, such as scares over toxins, to be counterproductive for commercial fishers. Consumers may be scared away from all salmon in general; and
4. **Modest Quality Increases**. 'Just increase quality' is a frequently heard remedy for low prices, but there are limits to the potential to boost prices by boosting quality. Firstly, commercial salmon fishers and processors in

BC are already starting to take some initial steps towards increasing quality. Secondly, achieving major increases in the quality of salmon across the commercial fishery would entail changes in fleet composition and size, and changes in fishing practices and fishery management. Not only are these changes well beyond the scope of an ocean ranching program, but some of them also run counter to the traditional goal of maximizing employment from the fishery.

5.4.3 What Did We Learn?

The market and price issue is central to the question of whether a 'made in BC' ocean ranching initiative could be economically viable in the long term. At the pre-feasibility assessment level, the following provides for consideration is a mix of analysis and business strategy formulation based upon reasonable analysis of past practise, such as branding, and reasonable market assumptions for the future. The following is presented to help set the context to answering the 'future market' question:

1. **Low Price Era.** Low prices are likely here to stay, but there will continue to be fluctuations. Some commercial fishers and ocean ranchers feel that it will be possible to gradually convince consumers to pay a premium for wild and ranched salmon above what is paid for farmed salmon;
2. **Quality Potential And Limits.** While the scope to increase quality in the commercial fishery without dramatic changes is limited, there are opportunities to increase quality and efficiency in the Terminal Harvest Areas of ocean ranching operations. If an Association/operation has the exclusive right to harvest the ranched salmon that reach a Terminal Harvest Area, then they can contract fishers to harvest those salmon in a way that maximizes efficiency and quality. For instance, this could mean delivering the salmon to a processor when the salmon are still alive or have already been bled, and in such as way as to enable processors to use all parts of the salmon (flesh, roe, oil) rather than just one part;
3. **Species Mix.** The Alaskan ocean ranching program has traditionally focused on chum and pink salmon production. Due marketing considerations, however, species and price composition is a factor becoming increasingly important that is being reflected in an increase in chinook and coho production. Informal discussions with the BC fish processing and sport fishing industries suggest there is a strong interest in these species. With regard to Alaska sockeye production and ocean ranching, there has been considerable interest but the experience has not been very good. Informal discussions with the BC fish processing industry suggests that the potential for ocean ranched sockeye be assessed given the BC experience.
4. **Traceability.** Currently wild and ranched salmon are treated equivalently for marketing and labelling purposes in both BC and Alaska, since they are both caught in the open ocean. However the concept of traceability is

gaining ground in marketing, particularly in Europe, and it means that consumers want to know exactly how the food they buy got to their plate. This could eventually mean labelling which fishing vessel caught the salmon, but it is also conceivable that consumers may eventually want to know whether the wild-caught salmon came from a hatchery or not;

5. **Marketing Campaigns.** There may be room to strengthen generic marketing of salmon in BC. As for regional marketing campaigns and branding, these have shown occasional success. That success may be duplicable in some cases, but it is not easy and is no panacea. Coordination between marketing campaigns helps. In general, it is widely believed that BC is at a disadvantage on salmon commodity markets (such as canned salmon), but that it can find an advantage in serving quality and niche markets (value added product forms);
6. **Cost Recovery Harvests And Processors.** Ocean ranching operations that are marketing their Cost Recovery Harvests to processors in advance of the harvest need to be able to demonstrate that mechanisms are in place to ensure that the quantity and quality of the harvest will be within the predicted range. Building up a reliable track record over time certainly helps. Processors that purchase a Cost Recovery Harvest in advance are able to turn around and market it to buyers in advance, possibly earning a premium or creating a higher value product form. It also helps processors that the ocean ranching operations are sometimes able to adjust the pace of harvesting and delivering the Cost Recovery Harvest in order to fit the needs and capacity of the processors; and
7. **Flexibility To Serve Different Markets.** Historically the market for Pink and Chum salmon has shifted from time to time between being a 'flesh' market, a 'roe' market, or both. Depending on harvest location, species, and the specific stock, the harvested ranched salmon may be saleable on one or the other markets, or both. Clearly there is an advantage to designing an ocean ranching project that has the flexibility of serving both of those critical markets, so that it is not dependent upon prices in a single market for a single product form. For instance, it would be risky to depend on a stock that was only ever good for roe due to the choice of stock or the location of the terminal harvest.

5.4.4 Where Do We Go From Here?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy, addressing the issues associated with marketing and prices must be a key element of the next phase. With this in mind, there are several logical next steps that could be done through a feasibility level study:

1. **Realistic Market And Price Forecasting.** A 'made in BC' ocean ranching initiative must not be established on the basis of expecting prices to return to historic highs. Processors and experienced personnel must be consulted with to determine reasonable future market and price

projections. Factors must be assessed such as how widely shared and credible is the belief that consumers will or do pay a small or larger premium for wild or ranched salmon as opposed to farmed salmon;

2. **Regional Marketing And Branding.** If regional marketing or branding is raised as a possibly useful tool for a specific ocean ranching project, first research what made other campaigns successful, figure out whether those characteristics are present, and consider coordination issues with other BC salmon marketing campaigns;
3. **Flexibility and Diversification.** Build flexibility/diversification into any project, so that ocean ranching can better weather fluctuating and evolving prices and markets. Dependence on a single species, a single market such as flesh or roe, or a single harvest location is risky;
4. **Marketing And Sales Agreements.** Processors should be approached about possible marketing and sales arrangements. Further information is required from processors about a range of potential opportunities such as, for example, the purchase of salmon from Cost Recovery Harvests. Under what circumstances would a processor be willing to pay more or less for salmon from the Cost Recovery Harvest than for salmon from the commercial fishery? How can this fit into the design of a project?;
5. **Innovation And Efficiencies.** Further information is required as to what innovations and efficiencies could be introduced into a 'made in BC' ocean ranching initiative that could help address marketing and price issues. For example, investigate ways to lower costs and increase quality during Cost Recovery Harvests. In particular, identify, monitor and assess whether the innovative methods currently being tested by optimistic ocean ranchers in Alaska turn out to be judged as successful.

5.5 THE ENVIRONMENT AND WILD SALMON PROTECTION

A key element of the pre-feasibility study was to initially identify and assess the key questions and issues associated with ocean ranching and potential impacts to the environment and to wild salmon.

5.5.1 Alaska

Ocean ranching, as practised in Alaska, is an economic and conservation based alternative to fish farming. While recognizing that it is prudent to avoid ocean ranching in sensitive areas, it is viewed as an appropriate activity, with certain precautions, in many other areas.

Giving due consideration to environmental issues and the protection of wild salmon, ocean ranching as practised in Alaska is a system of enhancing salmon production and harvesting that is designed, located, and operated:

1. By a partnership of interests, rather than just government;

2. To increase common property salmon production;
3. To provide for selective common property harvest that minimizes mixed stock fisheries as much as possible;
4. To avoid or reduce harvesting and fisheries management problems;
5. To help meet conservation requirements;
6. To minimise risk to wild stocks; and
7. To achieve production that is economically viable and ensures that harvest levels support fishers.

5.5.2 British Columbia

There are important questions to be addressed with respect to the potential impacts of a 'made in BC' ocean ranching initiative with respect to the environment and wild salmon protection.

To provide a basis for dialogue around these questions, the NBBC has prepared a draft 'Ocean Ranching - Environmental FAQ's (Frequently Asked Questions). This draft report identifies some of the key environmental questions about ocean ranching, provides pre-feasibility level answers for consideration based upon available information, and highlights the differences between ocean ranching and fish farming.

The following are the frequently asked questions about ocean ranching that are addressed in the report:

1. What is ocean ranching? How does it differ from fish farming as practised in BC?
2. What are the economic and conservation benefits of ocean ranching?
3. How does ocean-ranching prevent over-exploitation of wild salmon in mixed-stock fisheries'?
4. What can cause wild stocks to decline?
5. Can ocean-ranched salmon spread disease to wild salmon?
6. Will ocean ranching introduce alien species, such as Atlantic salmon, to coastal BC habitats?
7. Will ocean-ranched salmon displace and compete with wild salmon?
8. What about carrying capacity and density-dependent competition?
9. Do enhanced salmon have different behaviours than wild salmon?
10. Why is genetics important?

11. Are wild salmon genetically pure?
12. What are the genetics-related concerns about enhanced vs wild salmon? (Hybridisation; Domestication; Inbreeding; Extinction; Straying; and Colonisation)
13. Would ocean ranching use genetically modified salmon?
14. Would ocean ranching pollute the ocean floor?
15. Are ocean-ranched salmon given drugs?
16. Are ocean-ranched salmon as nutritious as wild salmon? Are they toxic?
17. How can we regulate ocean ranching? Would the regulations be enforceable?
18. Will ocean ranching violate the priority on conservation of wild salmon?

The FAQ's report is viewed as a draft 'rolling' document that is designed to encourage comment and to incorporate these comments in updated versions.

5.5.3 What Did We Learn

There are several potentially serious environmental and wild salmon protection related issues associated with implementing a 'made in BC' ocean ranching initiative, such as ocean carrying capacity, that must be taken into consideration and ways found to effectively deal with them if ocean ranching is to move forward. As previously noted, Section 5.1.4 suggests that the development and implementation of a long term and carefully phased communications strategy will be required to engage and confirm both stakeholder and public support must be a key element of a viable initiative.

During the feasibility study phase, a key element will be determining how each of the Steering Committee members will communicate with their constituencies with respect to how the numerous technical issues described in the Environmental FAQs mentioned above can be accounted for in the project design.

1. **Broad Stakeholder Support.** The Project Steering Committee provides a basis for identifying and working with the stakeholders through a coordinated, cooperative and cost effective manner;
2. **First Nation Support.** A third critical element will be to place the environmental and wild salmon protection elements of an ocean ranching strategy within a stewardship context that will be supported by First Nations; and
3. **Environmental Organization Support.** A fourth critical element will be to engage key environmental organizations with the intent of placing the

environmental and wild salmon protection elements of an ocean ranching strategy within an acceptable and supportable stewardship context; and

4. **Government Support.** Government management agencies must be assured that moving forward on ocean ranching in B.C. can be done in a manner that ensures a minimal and acceptable level of risk;

5.5.4 Where Do We Go From Here?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy, addressing the issues associated with potential impacts on the environment and wild salmon must be a key element of the next phase. With this in mind, there are several logical next steps that could be done through a feasibility level study:

1. **Stakeholder Support.** The members of the Project Steering Committee could utilize the power point presentation developed for the project as a key communication vehicle to help build awareness of, secure input to and gain constituent support for a 'made in BC' ocean ranching strategy;
2. **First Nation Support.** The NBBC facilitated dialogue with a First Nations group or groups described in Section 5.3.4 could be utilized to build awareness of, secure input to and gain First Nation support for the environmental and wild salmon protection elements of a 'made in BC' ocean ranching strategy;
3. **Environmental Organization Support.** Engaging key environmental organizations with the intent of placing the environmental and wild salmon protection elements of an ocean ranching strategy within an acceptable and supportable stewardship context. For example, the World Wildlife Foundation initiated a certification body has certified the Alaskan salmon production;
4. **Government Support.** It will be essential to secure the support of the appropriate federal and provincial management in general and DFO in particular before a BC ocean ranching strategy can be effectively implemented. This will require a focused dialogue that must be based upon demonstrated First Nation and stakeholder support for the proposition that moving forward on ocean ranching in B.C. can be done in a manner that ensures a minimal and acceptable level of risk;
5. **Pilot Projects.** A 'pilot project' approach could be utilized to test, monitor and assess key unresolved environmental and wild salmon protection issues; and
6. **A Cross-sector Study Tour.** To be conducted involving all the key stakeholders.

5.6 INSTITUTIONAL CONTEXT

The historic, legal, jurisdictional, and corporate - or 'institutional' - context within which a 'made in BC' ocean ranching initiative would fit is a serious concern. The question is - *could a 'made in BC ocean ranching initiative be realistically implemented given the 'real world'?*

5.6.1 Alaska

There was a very solid institutional context to build upon. Several forces converged in Alaska to bring about ocean ranching in the form it took:

1. The Alaska constitution in the 1950's gave the state single jurisdiction over the salmon fishery;
2. Good prices for wild salmon in the 1970's, combined with temporarily low wild salmon production;
3. Commercial fishers had the foresight and willingness to volunteer their time, organize themselves into cooperatives, and invest in ocean ranching for the long term;
4. First Nations treaty issues were largely resolved;
5. The State Legislature enabled ocean ranching to proceed by allowing Private Non-Profit (PNP) ocean ranching associations to form and by allowing fishers in each region to hold a referendum on whether or not to adopt a salmon landing tax of 2-3% to invest in ocean ranching;
6. The Alaska Department of Fish and Game (ADF&G), the State regulatory agency in charge of fishery management, was not initially a driving force but it later came fully on board as trust was built up between ocean ranchers and the State;
7. The State of Alaska had surplus funds from oil revenue that it placed in a large Revolving Loan Fund available to PNPs;
8. There were two categories of PNPs: the regional PNP associations of fishery stakeholders, and the non-regional PNP corporations that were still non-profit but could be started by anybody although they had lower priority in fishery management decisions and loan fund allocations than the regional PNPs;
9. A pro-wild salmon conservation ethic among the general population, fishers, and the State led ADF&G to adopt and enforce genetics, broodstock, transplant, disease, and mixed fishery policies and regulations to protect Alaska's wild salmon stocks;
10. In the 1980's the State of Alaska chose to divest itself of most of the State constructed and operated hatcheries, and allowed willing ocean ranching operations to take on the responsibility;

11. ADF&G supports ocean ranching with laboratories that analyze salmon genetics, salmon diseases, and collect information from salmon that have been specially marked by hatcheries;
12. Incoming information from aerial surveys of escapement, marked-salmon analyses and other sources is used in each region by locally based, experienced and empowered ADF&G management biologists who have the authority to open or close fisheries on short notice. This intensive in-season management allows ADF&G to be responsive to the need to protect wild salmon or the opportunity to harvest more wild or ranched salmon; and
13. Ocean ranching goals and practices are co-managed by the associations and the State, with substantial public and stakeholder input, but the State retains veto rights.

5.6.2 British Columbia

The current institutional context in British Columbia is very much more complex than it was in Alaska when the state moved forward on ocean ranching.

1. The wild salmon fishery is managed by the Federal Department of Fisheries and Oceans (DFO), while salmon aquaculture is jointly managed by several agencies, primarily DFO at the Federal level and (MAFF) at the Provincial level;
2. Alaska is largely free of the uncertainty brought on by treaty negotiations. As previously noted, by history, tradition and law, First Nations have been, are and will continue to be intimately involved in all aspects of British Columbia fisheries. This fact brings a new and very complex dimension to the BC institutional context;
3. When the Salmonid Enhancement Program (SEP) was formed under DFO in 1977, DFO adopted a purely publicly owned and funded model of salmon enhancement;
4. SEP hatcheries were supposed to be designed so that benefits to society would be greater than the costs to taxpayers, but 'cost recovery' was not one of the original goals;
5. DFO chose not to adopt a recommendation to move toward a purely private for-profit model of ocean ranching suggested by Dr. Peter Pearse in 1982;
6. DFO did not explore the hybrid public/private model adopted in Alaska that involved stakeholders and cost recovery through Private Non-Profit (PNP) associations. The legal and institutional framework that would enable ocean ranching does not currently exist in BC;
7. DFO, however, did perform and publish internally several studies of potential ocean ranching and terminal harvest sites in the 1980's;

8. 'Cost Recovery' is often discussed around SEP hatcheries. There has been some but not much experimentation with cost recovery, and certainly nothing resembling the Alaskan model with long term arrangements and accountability to a multi-stakeholder Board of Directors;
9. SEP has barely experimented with releasing hatchery salmon at specially chosen 'remote release sites' away from the hatchery, which is a key tool used by ocean ranching in Alaska to target benefits to specific fishery user groups and to keep hatchery salmon separate from wild salmon;
10. MAFF has expressed an interest in being kept informed and possibly playing a supportive role in the investigation of ocean ranching. MAFF currently lacks the resources or interest to be a main driver of ocean ranching, and points out that DFO has primary jurisdiction and must be the focal point for interaction with government;
11. The Provincial Ministry of Agriculture, Food and Fisheries (MAFF) has however been a solid supporter of salmon farming and aquaculture.
12. MAFF and DFO feel under-resourced and under pressure from different interest groups and fishery user groups. DFO in particular is not eager to take on new policy issues, and finds it challenging to allocate the existing salmon harvest.

5.6.3 What Did We Learn?

There are several potential serious institutional constraints to implementing a 'made in BC' ocean ranching initiative that must be taken into consideration and ways found to effectively deal with them.

1. **Broad Stakeholder Support.** All the stakeholders must be involved, and there must be a high, but not necessarily unanimous level of support for moving forward on ocean ranching in B.C. The Project Steering Committee provides a basis for identifying and working with the stakeholders through a coordinated, cooperative and cost effective manner;
2. **Government Support.** A second critical element, that will make-or-break ocean ranching economically, is two-way cooperation between the government management agencies and the stakeholders that support and fund ocean ranching. This is to ensure that (a) the ocean ranching operation sets appropriate goals, and that (b) the fishery is managed with proper openings and closings for the different user groups so that an adequate portion of the benefits from the returning ranched salmon flow to the appropriate stakeholders and enable the ocean ranching association to recover its costs; and
3. **First Nation Support.** A third critical element will be to place an ocean ranching strategy within a context that will be supported by First Nations.

1. **Stable Agreements.** Ocean ranching agreements, such as allocation, permits, funding, and leases, must be stable and secure. This will ensure that potential investor stakeholders, such as commercial or sport fishers, development corporations, and processors, can have confidence that their investments and interests will be protected and that the program cannot be hijacked by a single interest group and cannot be arbitrarily shut down.

These four items are so critical, that their presence (especially 2b) is a large part of the reason for the success of ocean ranching in Alaska, and their absence is a large part of the reason for the failure of ocean ranching in other places like Oregon.

5.6.4 Where Do We Go From Here?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy, further assessment of the issues associated with the current institutional context must be a key element of the next phase.

With this in mind, and in addition to securing input from all the key parties with respect to the institutional context through the processes previously described under the 'Where "Do We Go From Here' report sections:

1. **Pilot Projects.** Given the very complex nature of the institutional context that must be addressed, a 'pilot project' approach should be given serious consideration.

6.0 PILOT PROJECTS

The Alaska legislature enabled ocean ranching coast-wide from the beginning by creating a review process and a loan fund. The State then left it up to the initiative of fishers in each region to form non-profit associations and bring specific proposals to the State.

Given the current context in BC, it is not reasonable to expect the Government to take the major step of enabling ocean ranching coast-wide all at once.

Stakeholder support and the results of this pre-feasibility study suggest that it is more realistic to encourage the Government, mainly DFO, to agree *in-principle* that the experience of ocean ranching in Alaska is promising enough to make it worthwhile to experiment with adapting the concept to BC. It is also reasonable to propose that this be done initially through two or more Pilot Projects. These pilot projects would be viewed as a limited, strategically designed test aimed at containing risks and enhancing support through achieving demonstrably positive results.

With this limited context in mind and central to the dialogue with DFO, several well crafted proposals for Pilot Projects could be presented. If those proposals

had the support of the stakeholders, showed the potential to be economically self-sustaining, and allowed for the protection of wild salmon, then it is anticipated that it would be very difficult for DFO to not seriously consider them.

For discussion purposes, the following provides suggested key elements to an ocean ranching pilot project approach to initially :

1. Secure an acceptable level of stakeholder support through the previously described processes;
2. Establish a vision and principles;
3. Establish an institutional and statutory context;
4. Identify suitable hatchery and release site locations and broodstock sources; and
5. Business plan development.

6.1 SECURING PILOT PROJECT SUPPORT

A broad basis of support for an ocean ranching strategy will be required. This support must be secured and demonstrated in three key areas; government, First Nations, and other stakeholders such as fishers, processors and conservationists.

6.1.1 Government

DFO is the most critical department. Other departments at the federal and provincial level will be important eventually:

1. Only DFO can green-light a Pilot Project;
2. Only DFO can provide the institutional guarantees that would give potential investors confidence that the Pilot Project would not be shut-down arbitrarily;
3. Only DFO can manage and allocate the returning ranched salmon to allow benefits to flow to stakeholders and to allow the ocean ranching facility adequate access to ranched salmon in the Terminal Harvest area;
4. If a quota system is introduced into the salmon fishery:
 - a. How will DFO relate this management tool to ocean ranching. For example if there are Individual Transferable Quotas, this could cause serious problems and complex challenges over time from a First Nation perspective if there is a consolidation of quotas; and
 - b. How will DFO ensure that negotiated First Nation salmon allocations are fully protected over the term, regardless of whatever fisheries management system DFO or its successor puts in place;

As previously noted, this will require a focused dialogue with government that must be based upon an acceptable level of First Nation and stakeholder support.

6.1.2 First Nations

As previously noted, there is a requirement to plan and implement an initial NBBC communication initiative that is designed to build awareness of, secure input to and gain First Nation support for a 'made in BC' ocean ranching strategy starting through a pilot project approach. Given the Letters of Understanding between the NBBC, the Native Fishing Association, the Aboriginal Fishing Vessel Owners Association, and the Northern Native Fishing Corporation, these First Nation fishing organizations are well positioned to undertake such an initiative.

6.1.3 Stakeholders

As previously noted all the stakeholders must be involved, and there must be an **acceptable**, but not necessarily unanimous level of support for moving forward on ocean ranching in B.C. The Ocean Ranching Project Steering Committee provides a basis for identifying and working with the stakeholders in a coordinated, cooperative and cost effective manner.

6.2 PILOT PROJECT VISION AND PRINCIPLES

At the April 2003 'NATIVE BROTHERHOOD OF B.C. FACILITATED OCEAN RANCHING 'MINI-CONFERENCE' - *AN UNREALIZED OPPORTUNITY FOR BRITISH COLUMBIA'S COASTAL COMMUNITY DEVELOPMENT?*' held in Nanaimo, B.C. there was strong agreement that a common vision and associated set of principles would be required to establish a viable ocean ranching partnership. With this in mind the following draft ocean ranching vision and principles were developed for review and comment, and are presented to help set the context for further dialogue within a pilot project approach.

VISION

'The revitalization, maintenance and the long term sustainability and diversity of west coast salmon stocks is essential to the socio-economic and environmental well being of British Columbia coastal communities.'

PRINCIPLES

1. Ocean Ranching should be a key component of an integrated approach to B.C. salmon management and enhancement leading to sustainability;
2. Ocean Ranching needs to be a partnership initiative between First Nations, government, industry, labour, fishers and the environmental movement - *for the benefit of the resource*;
3. Ocean Ranching is a long term investment spanning at least one or two generations of salmon stocks, and needs to be viewed as such;

4. Ocean Ranching must be managed to reduce risks using the best science and management techniques available - *but this does not mean NO risk*;
5. Ocean Ranching must have as its basic mission the task of enhancing the BC salmon stocks and their utilization as a common property resource;
6. A 'made in B.C.' Ocean Ranching strategy must create a financially self-sustaining management regime through a range of investments by the beneficiaries of the strategy;
7. A 'made in B.C.' Ocean Ranching strategy must be 'embedded' within a larger federal and provincial socio-economic policy framework;
8. A 'made in B.C.' Ocean Ranching strategy must recognize the 'pre-treaty' situation, and that First Nations and commercial and recreational fishers and coastal communities must benefit from the partnership in a substantial way;
9. A 'made in B.C.' Ocean Ranching strategy must recognize that because it is based upon a mutually beneficial partnership, new arrangements will be required between all the partners that will reach beyond just producing more fish; and
10. A 'made in B.C.' Ocean Ranching strategy must be built upon transparency, and open communication between all the partners.

6.3 PILOT PROJECT INSTITUTIONAL AND STATUTORY CONTEXT

The long term institutional context for a 'made in BC' ocean ranching initiative should be framed by the pilot project approach. Partnership based goals must be established, these goals must 'measurable' so that they can be monitored and assessed, and all the pilot projects should be incubators for future enabling legislation. The best available science should be used throughout.

The ADFG '*Private Nonprofit Salmon Hatcheries - Statutes and Regulations*' could provide an initial 'model' for considering a 'made in BC' ocean ranching institutional and statutory context. These statutes and regulations have evolved based upon three decades of experience. The following identifies some of the key topics included in the document:

Statutes

- * Fish and Game Code
- * Management of Fish and Fisheries
- * Fisheries and Fishing Regulations
- * Salmon Hatcheries

ADFG Regulations

- * Private Nonprofit Salmon Hatcheries
- * Applicability of Regulations
- * Permit Application Procedures
- * Regional Comprehensive Planning
- * General Provisions
- * Salmon Use

Regulations of the Alaska Board of Fisheries

- * General Provisions
- * Policy for the Management of Sustainable Salmon Fisheries
- * Private Nonprofit Salmon Hatcheries
- * Special Harvest Areas
- * Transportation, Possession and Release of Live Fish
- * Permit System
- * Regulation of Entry into Alaska Commercial Fisheries

Regulations by the Department of Commerce and Economic Development

- * Fisheries Enhancement Grants and Loans
- * Fisheries Enhancement Tax Appropriations

Alaska Statutes - Revenue and Taxation

- * Salmon Enhancement Tax
- * Salmon Marketing Tax

6.4 PILOT PROJECT SITING

A key element of a pilot project initiative must be identifying suitable hatchery and release site locations and broodstock sources.

Key questions for consideration are - 'What are the characteristics of a "suitable" hatchery site, release site, and broodstock?' The Ocean Ranching Project Steering Committee and regional circumstances must play a large role in answering that question. The Alaskan experience suggests the following characteristics are relevant, ranging from the technical and environmental to the economic.

6.4.1 Limnology

Rearing salmon in hatcheries and imprinting salmon at release sites requires a fresh water source with adequate and reliable flow, temperature and chemistry. This science is called limnology. DFO has already performed some relevant studies on some fresh water sources, and these studies should be obtained and examined to avoid duplication of effort.

6.4.2 Tidewater

Hatcheries (on land) and release sites (on water) should be located at or near tide-water, which is where fresh water meets and mixes with salt water in the ocean along the coast. Rearing the salmon in hatcheries long enough, and releasing them in tide-water instead of upstream when they are younger, achieves two purposes: it can boost the overall survival of ranched salmon, and it avoids sensitive issues of competition between ranched and wild salmon in rivers and streams.

6.4.3 Segregation During Growing and Maturing

The carrying capacity of streams and rivers is typically considered far more limited than in the open ocean, which is partly why a tidewater location is recommended. But some salmon species spend a substantial part of their lifetime in near-shore and tide-water areas, where the carrying capacity varies somewhere between the vastness of the open ocean and the limitation of rivers. In certain circumstances, especially when done on a very large scale, ocean ranching could raise wild salmon competition concerns in specific sensitive coastal areas.

It would be best to anticipate this concern in advance, and either choose a location where it is not likely to be raised for biological reasons, or find or perform studies which reveal whether or not competition between wild and ranched salmon at a given level of production at that location is a legitimate concern. Monitoring and accountability for this concern may need to be built into the design of the Pilot Project proposal.

6.4.4 Segregation During Spawning

To keep wild and ranched salmon segregated, it is important to select a fresh water source that is not significantly used for spawning by wild salmon of the same species as the ranched salmon being imprinted to return to that fresh water source. The goal is to avoid ranched salmon creating a new wild stock or breeding with existing wild salmon. A physical obstruction such as a waterfall at the entrance is the most obvious choice for a water source that does not have wild salmon, but it is definitely not necessary. Wild salmon of a particular species may not spawn in certain streams for other reasons, such as an absence of appropriate spawning grounds upstream.

6.4.5 Segregation During Harvesting

Typically some ranched salmon are released right in front of the hatchery, and others are imprinted and released at other "Remote Release Sites". Because of the natural homing ability of all salmon, the ranched salmon will try to return to their release site. In most cases, the majority of the ranched salmon are intercepted by fishers in the common property fishery before they reach their original release site. The harvesting of the remaining ranched salmon at their final destination, their original release site, is called a "Terminal Harvest". For

both economic and environmental reasons these Terminal Harvest Areas/Release Sites must be chosen carefully.

To minimize straying, to avoid mixed stock fisheries, and to enable the harvesting of as many of the ranched salmon as possible, it is desirable to intensively harvest the ranched salmon in a Terminal Harvest Area where wild salmon are absent. *Note that segregation can be achieved spacially and/or temporally*, which means putting ranched salmon in places where wild salmon either don't go or have a different run-timing. An inlet where wild salmon do not pass through to spawn, or where wild salmon migrate at a different time of year, would be ideal.

6.4.6 Infrastructure, Communities, and Fishers

First, hatcheries need a power supply and transportation. Some hatcheries keep generators and fuel on hand in case of emergencies, but all depend on a regular source of power such as a hydro plant nearby or on the site. Either such a hydro-plan and a road will already exist, which lowers capital costs, or a site has to be selected where critical infrastructure can be built.

Second, proximity to a community may also be important, because of the need to supply the hatchery, the goal of possibly providing some employment to the community, and the desire to have a community as a stakeholder.

Third, there is no point creating new harvest opportunities for fishers at times or locations that fishery stakeholders do not find convenient or desirable. For example, a community or First Nation might prefer new subsistence fishing opportunities to be nearby the community, and the regional sport fishing industry might prefer new sport fishing opportunities to be within range of existing lodges. Stakeholders must be heavily consulted.

6.4.7 Broodstock Source

A broodstock that is suitable at one hatchery may not be suitable at another hatchery with a different location and different goals, so the broodstock selection decision cannot be taken in isolation from other decisions. Ultimately the decision will be limited by what is available and what DFO is willing to grant a permit for. The broodstock source will likely have to be a healthy wild stock with surplus spawners. A 'local' broodstock from the same region or watershed as the proposed hatchery may be appropriate, to reduce genetics concerns and to raise marine survival.

From the perspective of ocean ranching it helps if there is already a good deal of knowledge about the broodstock: including marine survival, disease history, migration route, years spent in ocean, run-timing, straying rate, size at return, quality of the flesh that could be expected in the proposed terminal harvest area, market value, etc. Such specific data may not be available but biologists may have enough information to make reasonable estimates and comparisons

between broodstock. This would help in the selection of one broodstock over another, and it would help with planning and forecasting.

Some characteristics such as marine survival and flesh quality are clearly good, while others may involve trade-offs. For instance, in terms of segregating wild and ranched salmon, there may be a choice between the proximity and the run-timing of the broodstock. If you select broodstock from a wild stock very close to the hatchery then the effect of any inter-breeding due to straying would be minimal since the wild and ranched salmon would be nearly identical genetically, but alternatively if you select broodstock from a somewhat more distant source with a different run-timing then the genetic differences would be larger but the probability of inter-breeding would be lower.

Run-timing is important because it can facilitate segregation and fishery management. It is also important because there may be a marketing advantage to having a ranched stock that can be sold before or at a different time than other salmon of the same species are on the market and being processed by processors who have limited capacity.

6.4.8 Species

The commercial value of different salmon species relative to the cost of rearing them is not the only factor to consider, since there may be sport and subsistence stakeholders too. It will, however, be one of the most important factors. It happens to be the case that the easiest species to ocean ranch are also the least valuable. Pink and Chum are easy and cheap to raise in large numbers but have extremely low market value. Coho and Chinook cost more and take longer to rear, but they earn a higher price. Sockeye are the most demanding to rear, yet they are also in the highest demand by the market.

With just a pre-feasibility level assessment it is impossible to say in advance that one species is more profitable than another. The answer will depend for example on the precise cost and price differences for each species, which will depend on factors such as the technology chosen, the broodstock selected, and the future prices anticipated.

At present, DFO policy grants sport fishers priority access to Chinook and Coho, and commercial fishers and processors express the most interest in Sockeye. These preferences could change, depending on whether or not ranched salmon would have to fit into existing DFO allocation policies, and whether or not precise cost benefit analyses reveal Sockeye to be the most profitable species to ocean ranch.

6.4.9 Diversification

Diversification has been discussed in more detail in other parts of this report, but it simply means “don’t put all your eggs one basket”. An ocean ranching operation will be better able to survive and adapt to changing and fluctuating

conditions, whether they be economic or biological, if it can draw on several programs – i.e. more than one hatchery, species and release site.

6.4.10 Communication and Consultation

This requires talking to, learning from, and organizing stakeholders in the region. A purely top-down approach would be a dead-end. Ocean ranching in Alaska proceeded because there was both strong bottom-up pressure and funding from commercial fishers as well as top-down enabling legislation and financing.

In addition, the funding and co-management of ocean ranching by stakeholders in Alaska is possibly even more interesting than the actual technology of ocean ranching itself. It allows the ocean ranching association to internalize many of the incentives to behave responsibly that can be absent in a purely public or a purely corporate ownership model. And stakeholder involvement may also help ensure that benefits flow to struggling fishery user groups and communities, rather than re-enforcing current trends towards their marginalization.

Both coast-wide and local stakeholders in ocean ranching are likely to have innovative ideas on how to structure and finance the association, and on what its specific goals should be.

6.5 BUSINESS PLANNING

To ensure the viability of each proposed pilot project, a rigorous business planning process should be established. The selected pilot project initiatives must be focused on maximizing success and learning.

The business planning process is needed to figure out which proposals would have benefits substantially greater than the costs, and under which circumstances it would be in the interest of certain stakeholders to invest. The following provides examples of questions that will likely have to be given consideration.

1. For instance, at a given production level with a given species and broodstock, what would be the total value of the ranched harvest? What would be the costs of producing it? How is the total harvest value affected by the portion taken by different gear types, by the ocean ranching association in the Terminal Harvest area, by sport fishers, by subsistence fishers, and by non-Canadian fishers?;
2. What would the harvest size and allocation have to be to make it worthwhile for each commercial gear group, and for sport fishers or their industry, to see that the benefits of their investment outweigh the costs? What is the optimal scale of production?;
3. What combination of contributions could get a Pilot Project off the ground and make it sustainable? For instance, a landing tax, license fees, Cost

Recovery Harvests, grants, loans, and land or facility transfers may be considered; and

4. Price forecasting will be critical. If assumptions are too pessimistic then the stakeholders risk talking themselves out of a good project, but overly-optimistic assumptions can just as easily lead to approving a bad project. Processors will be an important source of price forecasts, though it should be recognized that processors have a vested interest in low prices just as commercial fishers have a vested interest in high prices.

As a more detailed level of analysis is reached, planners will need to figure out the price earned by each gear type, and by the ocean ranching association from the sale of ranched salmon in the Terminal Harvest area. Depending on the quality of the broodstock, on the species, and on the location of the Terminal Harvest area, the quality of the ranched salmon that reach the Terminal Harvest area may be equivalent to or lower than that of ranched salmon that are intercepted further out by commercial fishers. However, Alaskan ocean ranching associations are experimenting with ways to harvest ranched salmon in the Terminal Harvest area in ways that lead to lower costs and/or higher quality.

6.6 WHERE DO WE GO FROM HERE?

If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy based upon the pre-feasibility assessment, a Pilot Project approach provides a logical next phase required for feasibility and business planning purposes.

It is suggested that it would be very difficult to conclude a feasibility analysis without going through a Pilot Project evaluation and assessment process that would entail detailing several good potential sites. This assessment would entail factors such as, but not limited to, projected production targets by species for specific sites, monitoring and assessment requirements, market assumptions and price by species, management policies and transportation and infrastructure costs. All of these will be important to establish feasibility from an investor point of view, whether public and/or private.

7.0 PROJECT STEERING COMMITTEE & POWER POINT PRESENTATION

The preceding has addressed Project Objective #1 that was to develop a partnership based 'Ocean Ranching Joint Working Paper' as the next step to moving forward from a NBBC Discussion Paper. The following briefly addresses status of the other two project objectives that respectively were to:

1. Assess the business case at the pre-feasibility level, and using the results, develop a multi-purpose ocean ranching 'Power Point' presentation; and

2. Establish a partnership based and NBBC facilitated Ocean Ranching Steering Committee to examine all of the factors that bear on the feasibility of ocean ranching in B.C.

7.1 POWER POINT PRESENTATION

An Ocean Ranching Power Point Presentation has been developed and initially tested with some members of the Project Steering Committee. If it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy based upon the pre-feasibility assessment, it is anticipated that this presentation will be central to the consultation and support confirmation initiative briefly described in Section 5.1.4. This presentation is available under separate cover, and may be obtained upon request to the NBBC office.

The current Executive Director of the Northern Southeastern Regional Aquaculture Association, Peter Esquiro, has provided the NBBC with a copy of a Power Point presentation of their operation, and has given permission to draw upon it in the consultation and support confirmation initiative. This presentation is available under separate cover, and may be obtained upon request to the NBBC office.

7.2 PROJECT STEERING COMMITTEE

At the NBBC facilitated Ocean Ranching 'min-conference' held in 2003, there was a general consensus that it would in-principle be appropriate to form a partnership to further consider ocean ranching as a potentially strategic economic opportunity for BC coastal communities. At this meeting and with this in mind, it was agreed that the NBBC would initiate discussion with potential partners with the intent of establishing an 'Ocean Ranching Project Steering Committee'. Since then, considerable progress has been made.

To set a context for developing this Steering Committee, the NBBC built upon considerable dialogue with potential partners that was conducted under a Partnership Project funded by Indian and Northern Affairs Canada (INAC). This project assisted in the signing of a number of formal Letters of Understanding. These LOU's generally recognized the need for a viable 21st Century fishery for all commercial species of fin fish and other marine resources.

The LOU's signed by the NBBC include: the Indian commercial fishing organizations - the Native Fishing Association, Aboriginal Fishing Vessels Association and Northern Native Fishing Corporation; the fish Processing Industry, the BC Aboriginal Fisheries Commission; the Sport Fishing Institute of BC, the Coastal Community Network, and the United Fishermen and Allied Workers Union.

All have informally expressed interest in-principle in participating on an Ocean Ranching Steering Committee. That said, all have indicated that dialogue will be

required to secure formal endorsement of Project Steering Committee membership at the Board/Executive level.

Regarding First Nations, an 'Ocean Ranching' Resolution was passed by consensus at the 71st Native Brotherhood of British Columbia (NBBC) Convention held in November 2002 in Burnaby. This Resolution mandated the NBBC to facilitate the review and assessment of ocean ranching as an alternative to fish farms in coastal British Columbia waters, and to develop a strategy and action plan. At the recent November, 2004 NBBC Convention a Resolution was passed by consensus that the NBBC be supported in seeking the funding and resources required for the next Phase of the Ocean Ranching Initiative.

It was noted in the report that engaging some key environmental organizations in the dialogue will be important. There are indications that such dialogue could prove constructive. For example, Ecotrust recently published 'Catch 22, Conservation, Communities and privatization of B.C. fisheries - an economic, social and ecological impact study (November, 2004). In their conclusions and recommendations they state "DFO in partnership with provincial, municipal and First Nation governments should permit the establishment of and provide funding for Community Quota Entities, which would be non-profit societies established to hold fisheries licenses and quotas for Aboriginal and non-Aboriginal rural fishing communities" and "The CEQ program would be modelled on a similar program established in Alaska, including government-funded loans of up to \$2 million for each CEQ".

Informal dialogue was also held with a number of federal and provincial agencies, including: Fisheries and Oceans Canada; Indian and Northern Affairs Canada; Western Economic Diversification Canada; Human Resources Development Canada; and the Ministries of Sustainable Resource Management and Agriculture, Food and Fisheries. As noted in the report, the historic, legal, jurisdictional, and corporate - or 'institutional' - context within which a 'made in BC' ocean ranching initiative is a serious concern. While a number of agencies expressed possible interest and support, the pre-feasibility study made it very clear that considerable dialogue will be required with key federal agencies, DFO in particular, and with the Province to secure the required support.

8.0 CONCLUSIONS

The purpose of the NBBC Phase II contract from Western Economic Diversification was to conduct a 'B.C. Ocean Ranching Pre-Feasibility Assessment'. The central question to be addressed was:

"Considering the Alaskan experience and from the perspective of the interested parties, is ocean ranching a viable and desirable option for British Columbia to which we should devote more time, money and effort - YES or NO?"

Given this question, the following project conclusions are presented for consideration:

1. It is time to make a decision. There is enough information available to the Ocean Ranching Project Steering Committee to First Nations, government and other interested stakeholders to determine if the initiative on ocean ranching should be moved forward to the next level - or not;
2. Based upon the project results summarized in this report, at a pre-feasibility level the answer to the question is **YES**, and that more time, money and effort should be devoted to exploring ocean ranching as a desirable option for British Columbia;
3. Although the pre-feasibility assessment suggests that all things considered it is worthwhile to move forward, there are a number of issues and questions associated with, for example, institutional constraints and marketing that have to be explored in considerably more detail;
4. A Pilot Project approach provides a logical next phase required for feasibility and business planning purposes. It would be very difficult to conclude a feasibility analysis without going through a Pilot Project evaluation and assessment process that would entail detailing several good potential sites.
5. Based upon several years of accumulating and assessing available data on ocean ranching, the NBBC considers that a limit has been reached about what can and should be concluded abstractly. In addition to data on factors such as marketing, further site specific information is required for a number of factors ranging from broodstock sources, wild salmon protection, monitoring and assessment through to the use of appropriate technologies. This information must be gathered dynamically in partnership with government and local stakeholders in the context of a grounded feasibility study;
6. With the preceding in mind, if it is decided that it would be desirable to move forward on a B.C. ocean ranching strategy the next logical step should be a much more detailed feasibility level study;
7. More specifically, key elements to an ocean ranching feasibility study should include, but not be limited to:
 - a. Increasing awareness and securing a broad basis of support from First Nations, stakeholders and government. This will require the development and implementation of a long term and carefully phased communications strategy to engage and confirm stakeholder and public support;
 - b. Confirming a vision and principles;

- c. Addressing in detail the issues associated with 'who pays';
 - d. Addressing in detail the question of whether ocean ranching could be economically viable in the long term given factors such as species mix. This must be based realistic pricing assumptions given knowledge of existing markets and competitive products. This will provide the basis for an assessment of the impact these will have on revenue projections and productions costs;
 - e. Utilize the proposed ocean ranching pilot projects to assess the potential impacts of a 'made in BC' ocean ranching initiative with respect to the environment and wild salmon protection;
 - f. Reviewing, assessing and reporting in on detail existing B.C. site-level ocean ranching related data that has been prepared by DFO, First Nations and the private sector;
 - g. Reviewing and assessing on the tangible, hard costs associated with actually investing in specific sites, including this being done on species specific basis;
8. Given the complex institutional situation, addressing the question whether a ocean ranching pilot project initiative could be realistically implemented. This would include the identification of the regulatory and other measures that would be required to move forward on pilots. This would also include, for example, a review and assessment of current key policy initiatives such as follow-up to the Pearse/McRae report; and
 9. A core element of a feasibility study should be the careful design and initial implementation of two or more partnership based Pilot Projects.

Given the results of the NBBC Phase II 'B.C. Ocean Ranching Pre-Feasibility Assessment' a context is provided for project recommendations, followed by specific project recommendation are presented for consideration:

8.1 RECOMMENDATION CONTEXT

In addition to a Pilot Project approach, there are six 'next step' areas that have been identified at a general level that shape the project recommendation context:

1. Communications and dialogue aiming at confirming stakeholder support;
2. A strategy to deal with institutional constraints;
3. Market analysis and pricing decisions for analytical purposes;
4. Financing;
5. Ownership models; and
6. A pilot project strategy.

8.2 PROJECT RECOMMENDATIONS

The following recommendations are presented for consideration:

1. Based upon Phase II project results, a detailed feasibility level study should be conducted as the next logical step required to move forward on a B.C. ocean ranching strategy;
2. With this in mind and supported by the members of the Ocean Ranching Steering Committee, an NBBC facilitated Phase III partnership and pilot project based B.C. Ocean Ranching Feasibility Study proposal should be developed, budgeted and submitted immediately. This proposal should detail the funding, resourcing and time frames required to undertake a feasibility level ocean ranching project that would focus on communications, institutional constraints, market analysis, financing and ownership models, and pilot projects;
3. With regard to the next steps in a carefully phased communications strategy to confirm stakeholder support, Phase III objectives should include but not be limited to:
 - a. Undertaking the dialogue required to secure formal endorsement of Project Steering Committee membership at the Board/Executive level;
 - b. Confirming a pilot project approach to address identified issues and concerns;
 - c. Engaging some key environmental organizations in the dialogue; and
 - d. Undertaking dialogue with federally agencies, in particular DFO, and the Province to secure the required support.
4. With regard to a strategy to deal with institutional constraints to implementing an initial pilot project based BC ocean ranching strategy, an assessment should be made that would include but not be limited to:
 - a. The DFO wild salmon policy;
 - b. MAFF aquaculture policy;
 - c. Treaty negotiation;
 - d. The Salmonid Enhancement Program (SEP) and SEP hatchery policy including cost recovery and divestiture; and
 - e. The Pearse/MacRae initiative;
5. With regard to an ocean ranching market analysis, Phase III objectives should include but not be limited to:

- a. Short, intermediate and long term domestic and international market and pricing assessments;
 - b. An assessment of values and optimal levels of production given species based harvest levels by the various sectors; and
 - c. An assessment of where will benefits likely outweigh costs;
6. With regard to an ocean ranching financing analysis, Phase III objectives should include but not be limited to an assessment of what combination of contributions could get a Pilot Project off the ground and make it sustainable? For instance, a landing tax, license fees, Cost Recovery Harvests, grants, loans, and land or facility transfers may be considered; and
7. The Phase III feasibility level ocean ranching analysis should be based upon a Pilot Project evaluation and assessment process that would entail detailing several good potential sites. This assessment would entail factors such as, but not limited to:
- a. Projected production targets by species for specific sites;
 - b. Monitoring and assessment requirements;
 - c. Market assumptions and price by species;
 - d. Management policies and transportation; and
 - e. Infrastructure costs.

10.0 REFERENCES AND FURTHER READING

The following provides a number of references for those who may be interested in securing further information on ocean ranching. Please note that the references provided are not intended to be an 'exhaustive' list. It is suggested, however, that this list and the references contained in the reports identified in this list is extensive.

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