Toward an Inshore Rockfish Conservation Plan

- A Structure for Continued Consultation -

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1.0 INTRODUCTION

1.1 Purpose

This paper is intended to guide consultations on conservation measures required to reverse the declines and enable rebuilding of inshore rockfish and Strait of Georgia lingcod.

> *The framework outlined in this paper provides a description of conservation problems and explores the challenges associated with limited scientific data and incomplete harvesting data. The key elements of the proposed conservation plan are described. For these elements, consultation objectives and specific questions are identified. Background information on the various fisheries that impact inshore rockfish stocks, including current estimates of fishery mortalities, is also provided.*

1.2 Background

On the basis of scientific advice, a serious conservation concern has been identified for inshore rockfish throughout British Columbia coastal areas. This concern is greatest within the inside waters generally understood to include Georgia, Juan de Fuca and Johnstone Straits (or Department of Fisheries and Oceans Management Areas 12 through 20 and 28 and 29). In addition a significant conservation concern for lingcod within Georgia Strait has also been identified.

Inshore rockfish includes the following group of species commonly found in water depths of less than two hundred meters; Quillback, Copper, Yelloweye (sometimes called red-snapper), China, Tiger, and Black rockfish. Black rockfish, while they may have some different biological characteristics, are included within this grouping.

Quillback and Yelloweye rockfish are frequently harvested as target species together with Copper, China and Tiger rockfish. Conservation concerns are most apparent on the Quillback and Yelloweye rockfish where there is specific evidence of unsustainable harvest levels. There is little information to directly assess harvest impacts on the other species. However, given that they have generally similar life history characteristics and are caught together with targeted species, conservation measures will encompass all these inshore rockfish species.

In December 1998, the Pacific Scientific Advice Review Committee (PSARC) recognized that conservation concerns and a strategy was required to address these. Subsequently, the 1999 Rockfish Conservation Strategy (RCS) was developed with the following four key objectives:

account for all inshore rockfish catch,

decrease fishing mortality,

establish rockfish protection areas, and

improve stock assessment.

Refer to Appendix A for more information on these objectives and steps taken to implement them. Despite the reductions in harvest over the past three years, the establishment of a number of area closures in the commercial fishery and the initiation of some additional catch monitoring programs, more restrictive measures are now required.

Various groundfish species, most notably lingcod, are frequently harvested in association with directed fisheries on inshore rockfish. Recent information suggests that neither inshore rockfish stocks nor lingcod (within Strait of Georgia) are responding and more significant and restrictive measures are required. (Canadian Science Advisory Secretariat; Working Paper G2001-02,"Assessments of lingcod in Strait of Georgia", J.R. King).

Active involvement of First Nations, commercial and recreational harvesters and other interested parties, will be critical to the success of rockfish conservation and rebuilding. It is important that the First Nation access to fish for food, social and ceremonial purposes be considered when assessing all potential conservation measures. Specific input from First Nations is required on proposed conservation measures for inshore rockfish in order to reconcile the needs for conservation measures with provisions of sufficient harvesting opportunity for their community. Every effort will be made to ensure that First Nations are provided sufficient information on conservation concerns identified, have an opportunity to provide input based on their own traditional ecological knowledge or other sources, and to fully share any concerns or ideas on these proposals. First Nations input will be initially requested in order to understand and learn of preferred food harvesting sites, methods and associated issues so that potential impacts of various conservation measures can be identified.

A consultation approach is proposed which utilizes both the existing consultation processes with First Nations and other harvesters together with broader, open processes at the provincial, community and local levels.

Consultations on conservation measures for inshore rockfish and lingcod in the Strait of Georgia will be guided by direction provided by the Minister of Fisheries and Oceans.

On December 14, 2001 the Minister of Fisheries and Oceans announced that strong measures for rebuilding rockfish stocks will be put in place by April 2002 to protect these populations for future generations, particularly for the Strait of Georgia and Johnstone Strait. In making this announcement he noted:

- Scientific data reveal that inshore rockfish populations are declining.
- A recent Pacific Scientific Advice Review Committee (PSARC) report (G2001-01, Yamanaka and Lacko, 2001) confirmed that, despite the introduction of some conservation measures in the late 1990's, stock concerns persist for inshore rockfish.
- Significant declines in these populations, coupled with the low productivity rate for these stocks, requires urgent attention and the introduction of conservation restrictions that will reverse declines and enable stock rebuilding. Achievement of this objective requires a harvest rate of less than two per cent.
- Consultations with First Nations, commercial and recreational fishers, and all interested stakeholders are required to develop a plan that will achieve this target.
- Specific measures that will be considered include the closure of directed rockfish fisheries, reduction of rockfish by-catch, establishment of closed areas for fishing that impacts inshore rockfish, improvements to catch monitoring and increased stock assessment.

Another 2001 PSARC report (Canadian Science Advisory Secretariat; Working Paper G2001-02,"Assessments of lingcod in Strait of Georgia", J.R. King) describes the significant conservation concern for lingcod within the Strait of Georgia. As a result, measures will also be required to minimize lingcod harvesting mortality within that area.

The life history and biological characteristics of rockfish also make stock assessment difficult. Many stock assessment tools used in other fisheries cannot be easily applied to rockfish. To better understand

these fish and their distribution, the current information base must be increased. A stock assessment framework for inshore rockfish is to be developed by December 2002.

Increased catch monitoring programs will be necessary to assist in providing stock assessment data and enable assessment of harvest rates.

In November 2001, a multi-disciplinary workshop on inshore rockfish was held in Nanaimo. There was general agreement on the importance of developing and implementing conservation measures to protect these groundfish species. The details of these measures, including specific locations, size, and timing of potential closed areas, will be determined through a consultative process throughout the Winter/Spring, 2002.

The department is committed to the sustainability of British Columbia's groundfish fisheries. With input from the consultation process, appropriate management measures will be put in place to protect and rebuild these species of concern in order to provide sustainable benefits for Canadians in the future.

The consultation framework is concluded with a description of the immediate and longer-term opportunities for interested individuals and groups to contribute to the decision-making process.

2.0 KEY ELEMENTS OF THE PROPOSED CONSERVATION PLAN

Recent scientific advice recommends that the four key objectives of the 1999 Rockfish Conservation Strategy be pursued in a significantly enhanced manner. These four objectives; the establishment of rockfish protection areas, significantly decreasing harvesting mortalities, accounting for all harvesting mortalities, and improving stock assessment specific actions are further enhanced and described below. Specific issues and questions are noted to solicit advice during the consultation process.

The objective of establishing rockfish protection areas is to ensure that extensive inshore rockfish habitat will be closed to fishing that may impact inshore rockfish. This provides a buffer against scientific uncertainty, and is considered an essential element contributing to the protection and rebuilding of rockfish stocks. These measures are also expected to provide some of the needed protection for lingcod stocks in the Strait of Georgia.

The second objective of significantly decreasing harvest mortality such that it is less than natural mortality is required to halt stock declines and to allow for rebuilding.

Increased catch monitoring is required to account for total mortality (retained and released) of inshore rockfish from all commercial, recreational and aboriginal fisheries. As noted previously, this information is currently weak and must be improved in order to monitor the impacts of fisheries and management measures on stocks of concern.

Lastly, stock assessment knowledge must also be improved in order to monitor the effectiveness of management measures over time and to ensure conservation and rebuilding objectives are achieved. This will require the development of habitat-based survey methods to estimate population abundance. These survey methods would form the basis for future stock assessment. The current assessment capability is poor due to the lack of fishery independent abundance estimates.

2.1 Establishment Of Rockfish Protection Areas

For inshore rockfish in particular, and groundfish in general, there are limits to our scientific knowledge. As previously indicated, data to accurately estimate the total biomass of inshore rockfish are currently not available and there are significant gaps in catch data (retained and released).

These rockfish grow slowly and are extremely long-lived, reaching lengths of 90 centimetres and ages of over 100 years. After these rockfish reach sexual maturity, at about 20 years of age, they produce larvae annually. The survival of the young rockfish is subject to ocean conditions and years of good survival appear to occur every 15 to 20 years. These life history characteristics of inshore rockfish result in low stock productivity, making inshore rockfish particularly vulnerable to over-harvest.

Given the current limitation of scientific information and the particular life history characteristics of these fish, traditional management measures alone are not sufficient to achieve conservation and rebuilding objectives. For these reasons developing rockfish protection areas (RPAs) or areas which are closed to inshore rockfish harvesting is an important management measure that can promote conservation by protecting a portion of rockfish populations.

Management Objectives for Rockfish Protection Areas (RPAs) include:

1. *To protect vulnerable rockfish species, to prevent their decline and to foster the sustainability of populations,* harvest impacts must be minimized. Inshore rockfish are generally sedentary in nature and do not migrate over large distances. RPAs are considered an essential management tool for the conservation of inshore rockfish.
2. Over the long-term, *enhance the production of larvae.* An increase in the size of individual inshore rockfish as well as in population densities should result in enhanced larval production.
3. Over time, *RPAs may provide a spillover of larvae into adjacent areas and a spillover of fish along the margins of the RPAs.* As fish and populations grow, it is expected that not only larvae would be dispersed over larger areas (with the prevailing currents), but that individual fish of various sizes would also move beyond the margins of the RPAs.
4. *To establish control and reference sites for scientific research and fishery assessment.* RPAs as well as areas where fishing activity occurs must be monitored and assessed to provide baseline data for stock assessment and advance the scientific knowledge of the effects of exploitation. Science is needed to provide advice to managers on the utility of RPAs as a management tool.

2.1.1 Defining and Establishing Rockfish Protection Areas

Recent research has suggested that a network of RPAs will be more effective than a single, large, RPA of equal area. A network of smaller areas potentially provides “spillover” benefits of both larvae and adults to adjacent areas that are open to fishing.

Choosing the location of RPAs begins by considering the biological factors important to inshore rockfish. In addition potential impacts on other fisheries and uses of the areas should also be assessed early in the process as well as considerations for monitoring and achieving compliance of fishing closures.

It is important that the First Nation access to fish for food, social and ceremonial purposes be considered when assessing all potential conservation measures and the establishment of rockfish protection areas in particular. Specific input from First Nations is required on the rockfish protection area approach in order to reconcile the needs for implementing serious conservation measures with provisions of sufficient

harvesting opportunity for their communities. For all specific RPA proposals, First Nation support and input is desired.

Subject to First Nation considerations as described above and consultations with all interested parties, RPAs would be established with carefully defined levels of restrictions. In all cases the objective is to identify specific areas that would be closed to harvest of inshore rockfish. In some situations, other harvesting activities would be considered where mortalities of inshore rockfish are negligible (as close to zero as possible). To assist in identifying the appropriate degree of flexibility the following distinctions may be useful:

Level I (most restrictive) – These are areas that would be closed to any type of harvesting activity that may impact inshore rockfish. Within these, essential information over the long term on natural population processes (target areas for stock assessment frameworks) would be generated, in addition, sanctuaries are established where species such as rockfish can thrive and contribute larvae and mature fish to other areas. The expected benefits of these areas can only be accomplished if the harvest rate of inshore rockfish is zero in those locations.

Level II (some flexibility) – These areas would be closed to harvest of inshore rockfish, but harvesting activities on other species may be permitted where mortalities on inshore rockfish are as close to zero as possible. Such closures would require comprehensive monitoring.

To successfully achieve their objectives, RPAs would require a high level of awareness, understanding and support and would be effectively monitored.

2.1.2 Process for the Identification of RPAs

The following basis has been determined for planning RPAs:

1. **Defined area of interest for management**
   - i) Inside waters include Fishery Management Areas 12 to 20, 28, 29.
   - ii) Outside waters include all other coastal Fishery Management Areas.

2. **Defined goals for the scope of RPAs**

   The Minister's December 14th expression of commitment to conservation measures does not prescribe percentages of areas to be closed to the harvest of inshore rockfish.

   However, as a key element of the Rockfish Conservation Plan under development, the Department has identified the following proportions of inshore rockfish habitat to be targeted as rockfish protection areas:

   - i) Inside waters – up to 50% of inshore rockfish habitat.
   - ii) Outside waters – up to 20% of inshore rockfish habitat.

3. **Consultations**

   Consultations will be conducted with First Nations, commercial and recreational fishing organizations, as well as local and broader community interests on the identification of proposed RPAs. It is recognized that effective compliance of closed areas will require the highest degree of awareness and support and thus open consultation processes are required.

The results of these processes will be consolidated by DFO and used as the basis for determining initial fishing closures in specific areas in 2002 and specific RPAs for implementation later 2002 and beyond.

2.1.3 Guidelines for the Identification of Inshore Rockfish Habitat and Proposed RPAs

a) Identification of Inshore Rockfish Habitat

Inshore rockfish are known to inhabit a wide variety of habitat types and require a variety of environmental conditions, often associated with both species and life-stage differences. However, for the purpose of identifying proposed rockfish protection areas a general definition of inshore rockfish habitat is provided below together with several specific RPA considerations.

Definition of Quillback and Copper rockfish habitat (commonly found up to 100 M in depth):

year round adult habitat - high-relief rocky reefs (rocky complexes/boulders, broken and cracked rocky areas)

summer adult habitat - low-relief rocky reefs with bull kelp cover

young of the year habitat - bull kelp forests, blade kelp slopes, eel grass/sand

Definition of Yelloweye rockfish habitat (commonly found in 50 to 200 M in depth):

year round adult habitat - broken rock and boulder habitats (adults tend to be in >105 M), pinnacles, rock overhangs

Charts have been provided for consultation purposes, to identify inshore rockfish habitat from which proposed rockfish protections areas can be identified. In many cases, DFO staff have begun the process by identified known habitat and high catch or abundance levels on these. Consultation participants are encouraged to amend or add to these initial notations to better describe critical inshore rockfish habitat.

b) Identification of Proposed Rockfish Protection Areas

1. RPAs should include habitat areas where there is a known presence of:
   a. abundant inshore rockfish populations, especially Quillback and Yelloweye
   b. known spawning, nursery or feeding grounds
   c. habitat areas where historically there were highly productive fishing areas but may at present be compromised.
   d. RPAs should include existing inshore rockfish research survey sites. These are noted below:
      - Gwaii Hanaas ($52^{o}03'$ & $52^{o}12'$ and $131^{o}13'$ & $131^{o}27'$)
      - Triangle ($50^{o}42'$ & $50^{o}51'$ and $129^{o}00'$ & $129^{o}20'$)
      - Top Knot ($50^{o}28'$ & $50^{o}32'$ and $128^{o}12$ & $128^{o}19'$)
2. Existing rockfish closed areas as identified on previous management plans, should be considered for broader application as RPAs. These sites are also noted on the base charts provided for consultation purposes.

As these sites are already closed to the commercial groundfish fishing, efficiencies and extended benefits can be achieved if they can be accepted by and applied to all harvesters.

c) Proposed Rockfish Protection Areas

1. For each of the proposed RPAs proposed:
   a. verify the rationale for its identification and whether any proposed flexibility is justified, e.g. abundant Quillback populations, most utilized fishing area, specific site considerations – depth, bottom-type, etc..
   b. describe the proposed boundaries and note on charts provided.
   c. estimate its proportion of the total inshore rockfish habitat area in the area.

2.1.4 Key Consultation Issues

First Nations:

- Specific input from First Nations is required on the rockfish protection area approach in order to reconcile the needs for serious conservation measures with provisions of sufficient food, social and ceremonial harvesting opportunity for their community.
- Specific information (traditional ecological knowledge or otherwise) from First Nations is required to fully understand First Nation concerns regarding any proposed RPAs. Specifically, FN input will be initially requested in order to understand/learn of preferred food harvesting sites and methods so that impacts of various conservation measures can be identified. First Nation support and input will be looked for on all specific RPAs proposed in each FN fishing area.

All Interests:

- What additions, deletions and amendments are required to inshore rockfish habitat areas outlined on DFO Area maps? (available at consultation sessions)
- Do you agree with the Rockfish Protection Area objectives?
- What specific rationale supports RPA proposals and where should the sites be located? (These should be noted on charts provided at consultation sessions or forwarded to the DFO contacts noted in back of this document.

2.2 Harvest Reduction

2.2.1 Biological Management Objectives

Rockfish

As described previously, the objective of significantly decreasing fishing mortality (F) such that it is lower than natural mortality (M) is required to halt stock declines (for most species) and to allow for rebuilding. Given that the natural mortality for inshore rockfish has been estimated to be approximately two percent, total fishing mortality must be less than 2 % to provide a sustainable harvest.

A recent PSARC report (PSARC - G2001-01, Yamanaka and Lacko, 2001) recommends that the precautionary fishing mortality rate for inshore rockfish be within the range of .5 to .75 of M. As M is estimated to be 2%, the recommended fishing mortality rate would be between 1 and 1.5%. However, given the scientific direction to use closed areas in combination with reductions in harvesting (TACs) in open areas (to fishing mortality rates less than 2%) , that combination is expected to keep the fishing mortality rate for the entire stock near the low end of the precautionary range, which will allow for rebuilding.

The objective is to lower the fishing mortality rate to less than 2% for these species. As explained above, fishing intensity and stock abundance vary by area and fishery, thus there will be some variability in the time to rebuilding and in the actual target fishing mortality rate used to rebuilding, among individual species and stocks.

To determine what steps may be required and what options are available to achieve the fishing mortality rate described above, it is necessary to consider all of the fisheries which may contribute to the total fishing mortality. These fisheries are considered separately for inside waters and outside waters. Detailed profiles of fisheries that impact inshore rockfish are included in Appendix # C.

Lingcod in Strait of Georgia .

The biological objective is to reduce fishing mortality on lingcod in Strait of Georgia to near zero.

Management options to achieve this include:

(i) non-retention fishery
(ii) shortened fishing season
(iii) time and area closures
(iv) gear restrictions

2.2.2 Harvest Rate Discussion

The goal for management is to harvest each species of rockfish at less than it's natural rate of mortality to ensure sustainability of the fishery. At present, there are difficulties in assessing and managing rockfish by species, particularly the inshore species that are commonly fished with hook and line gear in both the commercial and recreational sectors. Collection of information on catch (retained and released), natural and fishing mortality rates and selective fishing methods for each rockfish species are all long-term goals and necessary for the management of rockfish by individual species.

Quillback and Yelloweye rockfish are harvested as target species together with less common Copper, China and Tiger rockfish. Supporting information pertains primarily to Quillback and Yelloweye rockfish where there is evidence of unsustainable harvest levels. There is little information to assess harvest impacts on the less common species. However, given that they have similar life history characteristics and are caught together with targeted species as an aggregate group, conservation measures will remain precautionary and aimed on all these inshore rockfish species.

In the commercial fisheries for hook and line rockfish, Quillback, Copper, China and Tiger rockfish have been managed as a group called "Aggregates 1 and 2." In the past, Aggregates 1 and 2 have been managed as a group and given a single total allowable catch (TAC) and Yelloweye rockfish has been managed as a single species and given it's own TAC.

For the recreational fishery, many rockfish species are fished as a targeted or incidental catch using hook and line gear. The rockfish catch has largely been reported as an aggregate group but in recent years, in some areas, the rockfish catch has been reported by species.

Fishing mortality on Quillback rockfish within the Strait of Georgia has been estimated through catch curve analyses utilizing age data from biological samples taken during research surveys conducted in 1986, 1987, 1988, 1992, 1998 and 2001. Current harvest rates are estimated at 6% for these Quillback rockfish populations surveyed in Areas 12, 18 and 19. There is insufficient data to estimate harvest rates for either individual statistical areas within the "inside waters"/Strait of Georgia (Areas 12 – 20, 28 and 29) or for each individual inshore rockfish species. As a precautionary measure, it is assumed that the 6% harvest rate has occurred on Aggregates 1 and 2 and Yelloweye rockfish for the entire "inside" Strait of Georgia (Areas 12 – 20, 28 and 29). This precautionary assumption will remain until further monitoring and assessment of populations determine more accurately the harvest rates within smaller geographic areas and for individual rockfish species.

Similarly, Yelloweye rockfish fishing mortality has been estimated through catch curve analyses utilizing age data from research surveys conducted in 1997 and 1998 in the Queen Charlotte Islands and West Coast of Vancouver Island areas. Harvest rates of 4% have been estimated for Yelloweye rockfish. There is insufficient data to estimate harvest rates for either individual statistical areas or for each individual inshore rockfish species. Again, as a precautionary measure, the 4% harvest rate assumption is applied to Aggregates 1 and 2 and Yelloweye rockfish for the entire "outside" areas. This precautionary assumption will remain until further monitoring and assessment of populations determine more accurately harvest rates within smaller geographic areas or individual species.

INSIDE WATERS: (Areas 12-20, 28,29)

The following table summarizes the fishing catch estimates provided in detail in Appendix # D. As described previously site-specific surveys of Quillback rockfish in Areas 12, 18, and 19 over a six year period have been used to develop an estimate of total fishing mortality rate of 6% for inside waters.

CURRENT STATUS
2001/2002 Estimated Fishery Mortalities of Inshore Rockfish
INSIDE

	ESTIMATED MORTALITIES		TAC's	
Fishery	Yelloweye (tonnes)	Quillback, Copper China & Tiger (tonnes)	Yelloweye (tonnes)	Quillback, Copper China & Tiger (tonnes)
ZNI - Inside Rockfish	25.45	119.44	23	102
Recreational	6.27	50.38	n/a	n/a
T - Option B Trawl	1.37	0.04	0	0
C - Dogfish	0.38	6.86	0	0
L - Halibut	1.14	0.19	5	0
A - Salmon	0.001	0.11	0	0
S - Shrimp Trawl	0.0006	0.0002	0	0
First Nations	*	*	*	*
Totals	34.61	177.02		

The discussion of conservation measures must first consider the First Nation food fish requirements, recognition that the fishing mortality must be less than 2%, difficulties in eliminating all incidental by-catch of inshore-rockfish and the considerable uncertainty of catch data estimates.

For the inside waters, the following conservation measures appear to be consistent with the biological management objectives at least on an interim basis (e.g. until the full extent of RPAs is determined and more complete evaluations are conducted):

- No directed fisheries; including closure of ZN fishery (inside) and non-retention of inshore rockfish by the recreational fishery
- Enhanced conservation measures on Strait of Georgia lingcod.(see previous management options)
- Strict by-catch limitations in all other fisheries that incidentally catch inshore rockfish
- Increased selectivity in all fishing practices
- Site-specific fishing closures (until RPA consultations completed)

OUTSIDE WATERS: (WCVI, Central Coast, and North Coast)

Similarly, the following Table identifies the estimated inshore rockfish mortalities for 2001/2002 outside waters.

OUTSIDE WATERS

	ESTIMATED MORTALITIES		TAC's	
Fishery	Yelloweye (tonnes)	Quillback, Copper China & Tiger (tonnes)	Yelloweye (tonnes)	Quillback, Copper China & Tiger (tonnes)
ZNO - Outside Rockfish			315	223
Option A	36.15	169.42	n/a	n/a
Option B	90.94	14.07	n/a	n/a
Option C	49.24	2.38	n/a	n/a
Option D	101.41	-	123	13
Sub-total	277.74	185.87		
L - Halibut	225.75	13.92	169	36
T - Option A Trawl	7.90	4.90	13	10
C-Lingcod	16.34	3.84	n/a	n/a
C-Dogfish	1.10	20.05	n/a	n/a
K - Sablefish	9.80	0.13	n/a	n/a
S - Shrimp Trawl	-	-	n/a	n/a
A - Salmon	0.001	0.11	n/a	n/a
Recreational	3.92	5.32	n/a	n/a
First Nations	*	*	*	*
Totals	542.55	234.14		

As previously noted the total mortality rate of 6% for outside waters is estimated from site specific surveys of Yelloweye rockfish

It is recognized that significant gaps in the catch statistics remain, however, the information provides an indication of the scope of the challenge and the general distribution of the catch mortalities.
For outside waters, the following conservation measures appear to be consistent with the biological management objectives, at least on an interim basis until such time as the full extent of RPAs is determined and more complete evaluations are conducted:

- Significant reductions in inshore rockfish TACs
- Discussions with FN regarding their fishery
- Strict by-catch limitations in all fisheries
- Increased selectivity in all fishing practices
- Implementation of site-specific fishing closures.

KEY CONSULTATION ISSUES REGARDING HARVEST RATE REDUCTION:

- What alternatives are there to the suggested conservation measures to achieving the fishing mortality target for the inside waters?
- What specific measures can be taken to reduce the fishing mortality of inshore rockfish from 4% to less than 2 % in the outside waters?
- How could selective harvesting be improved to minimize the encounter rate and at-sea releases of inshore rockfish?

2.3 Catch Monitoring

2.3.1 Objective

- To establish a comprehensive catch monitoring program that will allow for an accounting of all inshore rockfish catch (retained and released) to meet conservation objectives,
- To facilitate establishing conservation targets for each of the fisheries.

2.3.2 Current Process

Current Monitoring and Coverage of Fisheries that Impact Inshore Rockfish Stocks

1. Recreational

Creel surveys currently cover the sport fishery in the inside waters and off the WCVI. This data supports a well established catch database. However, the survey coverage is limited to six months, – April to September. (*In the Victoria area (19 &20) the coverage continues all year).* In the Strait of Georgia interview coverage occurs at 42 sites and at 20 sites on the WCVI. In addition to species catch composition, interviewers also collect limited groundfish biological data such as lingcod samples, halibut weights and information on the location and duration of fishing trips and number and species of any fish not retained.

Effort coverage (boat trips) is based on overflights, which are arranged to place 6 flights/month during peak fishing times (July-August) and reduced to 4 flights/month for April-June and September. In addition, observers have been occasionally placed on selected boats (in 2000 in Victoria and Campbell Rv. fisheries) as part of an on-water verification program.

2. First Nations

DFO representatives collect the landed catch data from the local band guardians, biologists and from local C&P officers. However, this is mostly salmon data and there is minimal data available for inshore rockfish.

3. Commercial

Halibut

This fleet has mandatory fishing logbook requirements and is subject to 100% dockside monitoring of catch to verify species and weight landed. Limited observer coverage was in place for 1999, the costs of which have been primarily borne collectively by the halibut licence holders.

ZN Hook and Line Rockfish

This fleet has mandatory fishing logbook requirements and is subject to 100% dockside monitoring of catch to verify species and weight landed. In 2001 the target observer coverage was limited as the generally small boat size makes it difficult to place observers on board. Costs for this coverage have been primarily borne by DFO.

Schedule II (C) **-** lingcod/dogfish.

The fleet is subject to 100% dockside monitoring of catch to verified species and weight landed and has mandatory fishing logbook requirements. Logbooks were new for lingcod and dogfish in 2001. Observer coverage to date has been limited and the associated costs have been borne by DFO.

Groundfish Trawl (T)

Option A Trawl
This fleet is subject to mandatory 100% dockside monitoring of landed catch by independent port validators. The fleet is also subject to 100% at-sea observer coverage to capture accurate catch by species, by location and all at-sea release information. Mandatory fishing logbook requirements are also in place. The majority of costs associated with observer coverage have been borne by individual groundfish trawl licence holders.

Option B Trawl
This fleet is subject to mandatory 100% dockside monitoring of landed catch by independent port validators and has mandatory fishing log requirements. It is also subject to limited observer coverage (~5-10% in 2001) which gathers info on fishing location, catch and at-sea releases. Costs associated with observer coverage are borne DFO.

Sablefish

This fleet has mandatory fishing logbook requirements and is subject to mandatory 100% dockside monitoring of landed catch by independent port validators. Observer coverage to date has been limited. The majority of costs associated with observer coverage have been borne collectively by the Sablefish licence holders.

Shrimp Trawl

This fleet has mandatory logs to record landed catch, which is then verified by port monitors. However, at-sea releases have not been recorded and observer coverage to date has been limited. DFO currently covers the majority of the costs associated with the at-sea observer coverage.

Salmon

All vessels are required to fill out logbooks and hail-in catch results during the fishery. Observer coverage to date has been limited and costs generally borne by DFO.

2.3.3 Monitoring Issues

Data gaps

There are significant data gaps in catch statistics with many fisheries. Of most serious concern is the lack of reliable data for estimations of at-sea releases of inshore rockfish and other species. Estimated at-sea release calculations are based on extremely limited at-sea observer coverage or creel survey data.

1. Recreational

- Creel surveys do not occur 12 months per year for most area. In some areas where the rockfish fishery is significant, the creel surveys only occur for 6 months. In a number of areas such as the Gulf Islands, Desolation Sound, some mainland inlets and off WCVI, the creel surveys are incomplete or absent.
- Directed fishing effort on rockfish needs to be identified and quantified using existing data where available and/or conducting new programs.
- Aerial overflight data in some locations is insufficient in frequency and area covered and often not adequately co-ordinated with on-water observations.
- Many fishers have difficulty accurately identifying groundfish species.
- Biological sampling of groundfish at landing sites is not sufficient to allow age-frequency analyses.
- Independent on-water verification of rockfish discards (releases) is inadequate.

2. First Nations

In order to improve the catch recording process there needs to be First Nation support to record the data in all fisheries and make it available to their respective band biologist or fisheries manager.

- Accurate reporting of species identification of rockfish is inadequate.
- Limited attention to collecting and reporting catch data.
- Difficulty in estimating total directed effort on inshore rockfish.
- Biological sampling of groundfish is not sufficient to allow length and age-frequency analyses.
- First Nations catch database for groundfish is very limited.

3. Commercial

Halibut

- Independent on-water verification of rockfish discards (releases) is limited and inadequate.
- Biological sampling of groundfish at ports is limited and not sufficient to allow length and age-frequency analyses.

- Accurate reporting of species identification of rockfish is inadequate.
- Directed fishing effort on rockfish needs to be identified.
- Have the IPHC logbook data made available to DFO for rockfish bycatch analyses.

ZN Hook and Line Rockfish and Schedule II (C)

- Independent on-water verification of rockfish discards (releases) is limited and inadequate.
- Biological sampling of groundfish at ports is limited and not sufficient to allow length and age-frequency analyses.
- Directed fishing effort on rockfish needs to be identified.
- Accurate species identification of rockfish is limited and inadequate.

Groundfish Trawl (T)

Option A Trawl

- Need more biological data on inshore rockfish from this fishery.
- Biological sampling of groundfish at ports is limited and not sufficient to allow age-frequency analyses.

Option B Trawl

- Independent on-water verification of rockfish discards (releases) is limited and inadequate.
- Accurate reporting of species identification of rockfish at sea is limited and inadequate.
- Biological sampling of groundfish at ports is limited and not sufficient to allow length and age-frequency analyses.

Sablefish

- Independent on-water verification of rockfish discards (releases) is inadequate.
- Accurate reporting of species identification of rockfish at sea is inadequate.
- Biological sampling of groundfish at ports is limited and not sufficient to allow age-frequency analyses.

Shrimp Trawl

- Accurate reporting of species identification of rockfish at sea is inadequate.
- Independent on-water verification of rockfish discards (releases) is inadequate.
- Observer coverage of the beam trawl fishery is inadequate.
- Logbook program needs accommodate other groundfish species.

Salmon

- Accurate reporting species identification of rockfish at sea is inadequate.
- Independent on-water verification of rockfish discards (releases) is inadequate.

- Logbook program needs accommodate other groundfish species.
- Directed fishing effort on rockfish needs to be identified.

2.3.4 Key Consultation Issue

Given the existing data gaps and the objectives for an improved catch monitoring system, what specific measures would you suggest for each of the fisheries that impact inshore rockfish stocks? Which of these are the most critical and when should they be implemented?

As monitoring and observer costs may be prohibitive to fisherman in some fisheries and on smaller vessels, what alternatives are there that would still ensure that accurate catch and release data is achieved?

2.4 Stock Assessment

Stock assessment knowledge must be improved in order to monitor the effectiveness of management measures over time and to ensure conservation and rebuilding objectives are achieved. This will require the develop of habitat-based survey methods to estimate population abundance. These survey methods would form the basis for future stock assessment. The current assessment capability is poor due to the lack of fishery independent abundance estimates.

Fisheries and Oceans scientists will be developing a stock assessment plan for peer review and subsequent implementation in 2003. Opportunities to develop and utilize partnerships will be fully explored in this plan.

3.0 NEXT STEPS

The development of a comprehensive rockfish conservation plan will evolve during the next year. While a Ministerial decision on interim conservation measures is expected to include some key sites to close to harvesting activities and initial harvest reduction measures, further work will be required to ensure that the best and most appropriate mix is in place for the longer term.

First Nations, stakeholders, and other federal and provincial government agencies have all indicated that long term, fully integrated, conservation measures will require more extensive consultations. This is especially relevant for identifying rockfish protection areas where there success is dependent on a high level of local awareness, understanding and support in order to achieve the required compliance.

An open and inclusive multi-sector process to review the interim conservation measures and alternatives to these, together with an expanded and detailed network of proposed RPAs is proposed for late in the fall of 2002. In this way a more durable solution and broadly supported conservation plan can be implemented beyond 2002.

3.1 Sharing Information

Many interested individuals and organizations have asked that ideas and proposals regarding rockfish conservation be available for general circulation and review. A rockfish consultation website has been set up on the Consultation Secretariat's homepage to provide up-to-date information on the consultations. Included on the website is the background information paper to be used as a basis for the rockfish consultations, questions and answers, scheduled meetings, DFO contacts, submissions by stakeholders (with the permission of the author), and a link to further stock assessment and scientific information.

In addition, participants attending a November 2001 multi-sectoral workshop generally agreed that proposed rockfish conservation measures should be clearly understood, and preferably, widely supported. They asked that a second workshop be held in 2002 to openly discuss potential conservation measures. DFO will continue to canvas all parties on the value, focus and timing of a second forum.

http://www-comm.pac.dfo-mpo.gc.ca/english/database/Consult.htm

3.2 Contact Information

All submissions and responses to this paper should be sent to Colin Masson
via e-mail link: beamishk@pac.dfo-mpo.gc.ca,
by fax to: 604-666-9136 or
by regular mail to:
Colin Masson, Fisheries and Oceans Canada,
Suite 440, 555 W. Hastings St.,
Vancouver, BC V6B 5G3.

Electronic submissions are preferred.

APPENDIX A - 1998 PSARC ADVICE AND SUBSEQUENT MANAGEMENT ACTIONS:

In December 1998, the Pacific Scientific Advice Review Committee (PSARC) recognized that conservation concerns existed and a strategy was required to address these.

- Inshore rockfish are at best fully utilized and there are consistent signs of over-exploitation in the Strait of Georgia and in other coastal locations of British Columbia.
- The life history characteristics of rockfish make assessment and management difficult because they are extremely long-lived, slow growing, late in maturing, relatively sedentary over specific reef habitats, and experience high catch and release mortality.
- Due to these life history characteristics, the potential for over-exploitation is high and the recovery time of depleted populations can be decades in length.
- Given the serious assessment and management concerns for inshore rockfish, PSARC initially recommended in 1998, the development of a precautionary management plan that included localized management in the form of area harvesting closures in conjunction with a reduction of harvests across all fisheries in the open areas.

Subsequently, a Rockfish Conservation Strategy (RCS) with four key objectives was prepared as noted:

- account for all inshore rockfish catch,
- decrease fishing mortality,
- establish rockfish protection areas, and

improve stock assessment.

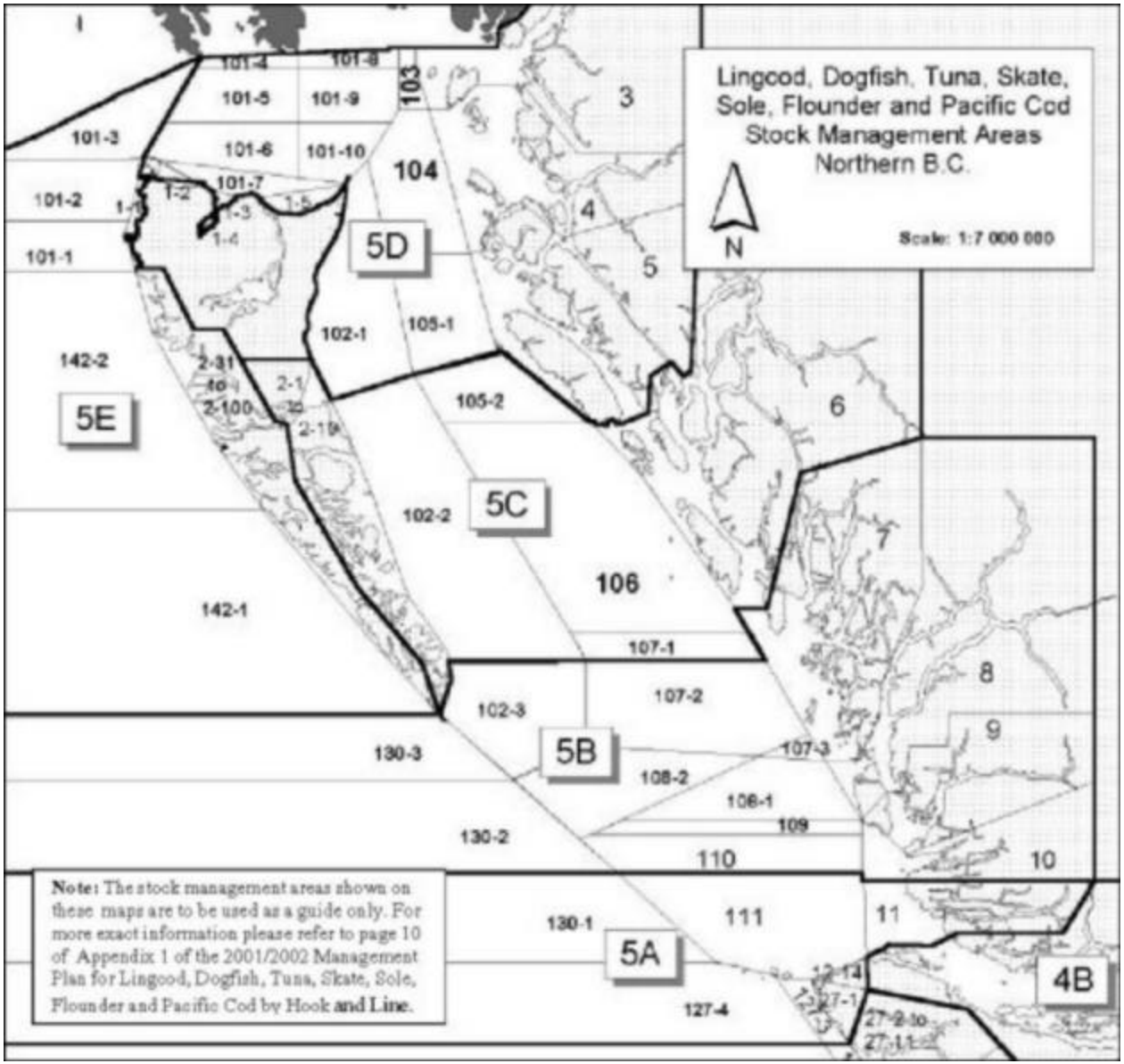
SPECIFIC MEASURES INCLUDED:

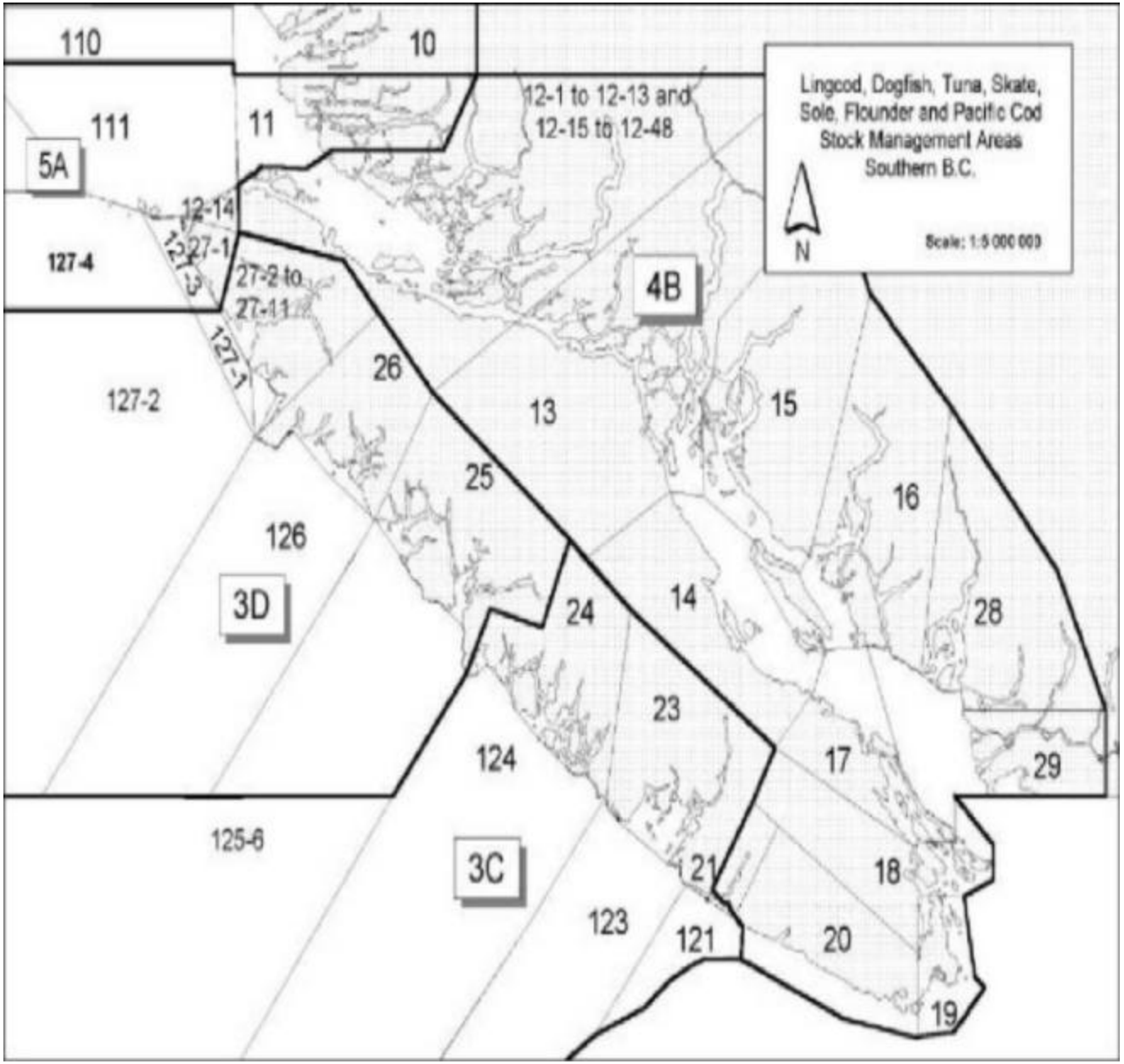
- To reduce fishing mortality, directed commercial longlining for lingcod was prohibited coastwide in 1999. To reduce rockfish by-catch, commercial total allowable catches (TACs) were reduced by 10% to 25% (depending on species) in 1999 for inshore rockfish. As well, a pilot program was implemented in 2000 that allowed combined fishing privileges for the directed rockfish and Halibut fisheries. Further, a “keep what you catch” educational campaign was implemented for recreational harvest of rockfish to reduce post-release mortality.
- Rockfish Protection Areas (RPAs for commercial groundfish harvesting) have been established at 18 sites along the coast of B.C. RPAs have been defined as (primarily commercial) no-take reserves where populations and their habitats may be protected from harvests. RPAs can be used to protect ecosystem structure and function, increase scientific understanding of management actions, and enhance non-extractive activities.
- RPAs established to date in B.C. are small, covering less than 1% of the coast. The RPAs are closed to the groundfish hook and line commercial fisheries (i.e. rockfish, Sablefish, Halibut, dogfish, and lingcod) and are not in effect for those non-groundfish commercial fisheries that may incur rockfish by-catch (i.e. salmon troll and shrimp trawl). For the recreational fishery, RPAs are in effect at two sites where there is a non-retention provision for inshore rockfish.
- To improve estimates of rockfish mortalities, partial observer coverage was implemented in the Halibut in 1999 and for lingcod, dogfish and sablefish fisheries in the 2001/2002 season. There is currently no coverage or estimate of rockfish mortality due to by-catch and discards in the lingcod

and dogfish commercial fisheries, or in non-groundfish commercial fisheries. The logistical difficulty of deploying observers on small boats and the cost of observer programs have hampered the acquisition of mortality information from these fisheries.

- Catch and release estimates for the recreational sector remain largely unknown. Currently, the Department is developing guidelines aimed at improving catch monitoring in all fisheries. Improvements to recreational reporting of rockfish catch and releases are a priority.

APPENDIX B – MAPS




110
10
111
11
5A
12-1 to 12-13 and
12-15 to 12-48
Lingcod, Dogfish, Tuna, Skate,
Sole, Flounder and Pacific Cod
Stock Management Areas
Southern B.C.
N
Scale: 1:5 000 000
12-14
127-1
127-4
127-3
27-2 to
27-11
4B
127-1
26
127-2
13
15
25
16
126
3D
24
14
28
23
124
17
29
125-6
3C
21
18
123
121
20
19

APPENDIX C – PROFILES OF FISHERIES

Profiles of Fisheries that Impact Inshore Rockfish Stocks

1. Directed Fisheries: ZN, Recreational, and First Nations

Licence Category ZN - General

Limited to 261 licences

Targets Inshore Rockfish – only directed commercial fishery (inshore rockfish)[1]

Became Limited Entry Fishery in 1991/1992[2]

Not an IVQ Fishery – Licences do not hold quota

ZN is a party based licence (not vessel based)

Two separate ZN licence categories – Inside ZN (ZNI) & Outside ZN (ZNO)

Hook and Line gear (longline, jig, handline and troll)

Inside ZN (ZNI)

- 71 licences (limited to 70, but an extra AFS licence has been created)
- Operates in Area 4B[3] (12-1 to 12-13, 12-15 to 12-48, 13 to 19, 20-4 to 20-7, 28, 29)
- Season commences on July 1 and usually finishes in November
- Total Allowable Catches (TACs) are established annually for Yelloweye and Aggregates 1 & 2
- Season closes when TAC of (Quillback, Copper, China, Tiger) and/or Yelloweye is attained
- Quillback, Copper, China & Tiger rockfish are harvested for a live market (handline gear)
- Yelloweye is harvested for the fresh fish market (longline gear)

Outside ZN (ZNO)

- 191 licences
- Operates in waters outside the Strait of Georgia
- Managed by areas: West Coast Vancouver Island (Areas 11, 12-14, 20-1 to 20-3, 21, 23 to 27, 111, 121-3, 123 to 127, 130-1) Central Coast (Areas 6 to 10, 106 to 110), Prince Rupert (Areas 3 to 5, 103 to 105), and the Queen Charlotte Islands (Areas 1, 2-2, 2-62, 2-69, 2-70 to 2-100, 101, 102, 130-3, 142)[4]

[1] Inshore Rockfish includes Yelloweye, Quillback, Copper, China Black, and Tiger rockfish (the inclusion of black rockfish continues but is under review). Yelloweye is managed as an individual species, while the other inshore rockfish are aggregated for management purposes: Quillback and Copper rockfish constitute Aggregate 1 rockfish, and China and Tiger rockfish constitute Aggregate 2 rockfish.

[2] Inside ZN (ZNI) became a limited entry fishery in 1991 and Outside ZN (ZNO) became a limited entry fishery in 1992.

[3] Area 4B is generally considered to constitute Pacific Fishery Management (statistical) Areas 12 to 20, 28 and 29. See attached maps.

[4] See attached maps.

- ZNO licence holders must choose a harvesting option (Option A, B, C or D) on an annual basis
- Season for ZNO fishery varies by area and by option

ZNO - Option A

- Targets Quillback, Copper, China, & Tiger rockfish for live market
- Opens in the spring for a short season in the Queen Charlotte Islands & West Coast Vancouver Island.
- These areas may re-open after the Halibut season closes[5]
- Option A opens in the Prince Rupert and the Central Coast areas on November 1 and usually closes in January or February
- March spawning closure

ZNO - Option B

- Targets Yelloweye for fresh market
- Option B also opens in the spring for a short season in the Queen Charlotte Islands & West Coast Vancouver Island
- These areas may re-open after the Halibut season closes
- Option B opens in Prince Rupert and the Central Coast on November 1 and can remain open until March

ZNO - Option C

- Targets slope rockfish such as Rougheye, Shortraker & Redbanded rockfish
- Option C opens in April coastwide and can remain open until March

ZNO - Option D

- Available for fishers holding both a Halibut (L) and a ZN licence
- Pilot status (commenced in 2000)
- Permits combination Halibut and rockfish fishing
- Managed under the Halibut fishery[6]

[5] Option D is allocated a Yelloweye and an Aggregate 1 and 2 TAC that is utilised in combination Halibut and rockfish fishing. After the Halibut season closes unused portions of the Option D TAC returns to the ZN fishery. If sufficient Option D rockfish is returned, Options A and B reopen in the QCI and WCVI Rockfish Quota Management Areas.

[6] Option D Inshore Rockfish can be accessed by entire Halibut fleet through reallocations of rockfish by-catch holdings. This is subject to annual holdings caps of 8,000 lbs. of Yelloweye and 1,500 lbs. of Aggregates 1 and 2.

Recreational

Annual average of 254,000 (1988-2000) Recreational licences are issued

Rockfish season is open all year

Hook & Line and Spear gear permitted

- Annual limit and minimum size limit - none
- Recreational fishers both target inshore rockfish and encounter inshore rockfish as a by-catch
- For Areas 1 to 11 and 101 to 111 – Aggregate Daily Limit is 8 (no more than 3 can be Yelloweye)
  - Rockfish possession limit is 16
  - Yelloweye possession limit is 6
- For Areas 12 to 29 and 121, 123 to 127, and 142 – Aggregate Daily Limit is 5 (no more than 2 may be Yelloweye)
  - Rockfish possession limit is 10
  - Yelloweye possession limit is 4

First Nations

- First Nations receives an allocation of "groundfish other species" that includes inshore rockfish.

2. Bycatch Fisheries: Halibut (L), Schedule II (C), Groundfish Trawl (T), Shrimp Trawl (S), Salmon Troll (AT), Salmon Gill Net (AG), Salmon Seine (AS), Sablefish (K), First Nations, Recreational

Halibut (Licence category L)

- 436 L licences
- Season opens in mid-March and closes on November 15[7]
- Hook and Line gear
- Halibut fishing is permitted coastwide
- Limited Individual Vessel Quota fishery – licences hold Halibut quota (attached to a vessel)
- Annual Halibut TAC
- Annual rockfish TAC
  - Rockfish TAC is divided into management areas (Strait of Georgia, West Coast Vancouver Island, Central Coast, Prince Rupert, and Queen Charlotte Islands
- Inshore rockfish, especially Yelloweye, is encountered as by-catch while longlining for Halibut
- Option "D" combination Halibut and rockfish fishing is permitted for those holding both a ZN and a Halibut licence[8]

[7]International Pacific Halibut Commission (IPHC) set the opening date for the 2002 Halibut season for March 18, 2002.

Schedule II (Licence category C)

- 569 C licences (schedule II)
- Vessel based licence
- All other vessel based commercial licences have Schedule II privileges
  - Approximately 4000 licences have Schedule II privileges
- Not a limited entry fishery
- Target species: lingcod, Dogfish, Tuna, Skate, Sole, Flounder, and Pacific Cod
- Not an IVQ fishery – C licences do not hold quota
- Area 4B for Schedule II Species is defined as Areas 12-1 to 12-13, 12-15 to 12-48, 13 to 20, 28, 29
- Outside waters are divided into the following management areas: 3C (Areas 21, 23, 24, 121, 123, 124, 125-6), 3D (Areas 25, 26, 27-2 to 27-11, 125-5, 126, 127-1 and 127-2), 5A (Areas 11, 12-14, 27-1, 111, 127-3, 127-4, 130-1), 5B (Areas 7 to 10, 102-3, 107-2, 107-3, 108 to 110, 130-2 and 130-3), 5C (Areas 2-1 to 2-19, 6, 102-2, 105-2, 106, 107-1), 5D (Areas 1-2 to 1-5, 3 to 5, 101-4 to 101-10, 102-1, 103, 104, 105-1)[9]
- Hook and Line gear (longline, jig, handline, and troll)
- No limits on quantity of skate, sole, and flounder permitted to be landed
- Only TAC managed Schedule II Species are lingcod and Dogfish

lingcod - General

- Longline gear is prohibited for directed lingcod fishing
- ZN fishers are permitted to retain lingcod caught by longline while fishing for rockfish
- Halibut fishers are permitted to retain lingcod caught by longline while fishing for Halibut or rockfish – lingcod catch weight cannot exceed 100% of the total weight of Halibut & rockfish catch
- Monthly lingcod catch limit – 15,000 lbs. (per licence)

lingcod - Area 4B

- Season opens July 1 and closes November 15 for a spawning closure
- Limited to Areas 12-7, 12-9, 12-10, 12-13, 20-1 to 20-4
- lingcod is not managed by a TAC in Area 4B
- Monthly lingcod catch limit – 15,000 lbs. (per licence)

[8] Option D Inshore Rockfish can be accessed by entire Halibut fleet through reallocations of rockfish by-catch holdings. There are annual limits for inshore rockfish under Option D and annual holdings caps of inshore rockfish for Halibut vessels. In 2001 Option D limits were 3, 526 lbs. Of Yelloweye and 360 lbs. Of Aggregates 1 & 2. Each Halibut vessel is subject to annual holdings caps of 8,000 lbs. Of Yelloweye and 1,500 lbs. Of Aggregates 1 and 2.

[9] See attached maps

lingcod - Outside Waters

- Season opens April 15 remains open until the Management Area TAC is taken or until November 15 when the lingcod fishery closes for a spawning closure
- Monthly lingcod catch limit – 15,000 lbs. (per licence)
- lingcod is managed by areas with separate TACs in outside waters: 3C, 3D, 5AB, 5CDE

Dogfish

- Dogfish opens April 1 and remains open until the TAC is taken (Area 4B TAC and rest of coast TAC)
- No Fishing Period Limits on amount of dogfish that can be landed except for TAC
- Dogfish is managed by Area 4B and outside waters
- Current rockfish by-catch allowance of 1% by weight of dogfish in Area 4B
- Area 4B by-catch allowance permitted only during the Inside ZN season
- Retention of rockfish is not permitted in outside waters

Groundfish Trawl (Licence category T)

- 142 T licences
- Year-round season – opens April 1 and closes March 31
- Limited entry IVQ fishery
- Groundfish Trawl is managed by management areas 3C, 3D, 4B, 5A, 5B, 5C, 5D, 5E
- Trawl net gear with mesh size restrictions based on area of fishing
  - Mesh size is larger in Areas 13 to 19 and 29
- T licensed vessel owners must choose one of two options:

Option A Trawl

- 70 active A licences
- Permitted to bottom trawl in all areas except Area 4B

Option B Trawl

- 36 valid Option B licences (17 active)
- Permitted to trawl in area 4B
- Area 4B described as areas 12 to 20 and 29
- Not permitted to fish for and retain rockfish

Sablefish (Licence category K)

- 48 Sablefish licences
- Season opens August 1 and closes July 31
- Trap and/or hook and line gear

- Does not operate in Area 4B
- Open in all areas except areas 11 to 21, 23 to 29, 102-1, 102-2, 103 to 107
- Retention of Rockfish is not permitted (except in the offshore seamount fishery)

Sablefish Seamount Fishery

- Limited fishery for Sablefish on Seamounts between 100 to 200 miles offshore
- Seamount fishery opens May 1 and closes October 31
- Seamount fishery managed as northern and southern offshore waters
- Rockfish bycatch
  - Trap Gear – permitted 10% of landed Sablefish weight
  - Hook & Line Gear – permitted 40% of landed Sablefish weight

Shrimp Trawl (Licence category S)

- 248 Shrimp trawl licences
- Season opens June 1 and closes when TAC is achieved or March 31
- Shrimp Trawl is managed by 36 shrimp management areas
  - Area 4B includes (12-22, 12-23, 12-26 to 12-48, 13 to 19, 23-1 to 23-6, 28, 29)
- Retention of incidentally caught finfish is prohibited
- Trawl net modified to reduce by-catch of other species
- Beam trawl and otter trawl gear

Salmon (Licence category A)

- 1406 Salmon Gill Net licences
  - 715 Salmon Area C (Areas 1 to 10)
  - 284 Salmon Area D (Areas 11 to 15 and 23 to 27)
  - 406 Salmon Area E (Areas 16 to 22, 28, 29 and 121)
  - 1 no area defined
- 539 Salmon Troll licences
  - 143 Salmon Area F (Areas 1 to 10, 101 to 110, 130 and 142)
  - 238 Salmon Area G (Areas 11, 20 to 27, 11, 121, 123 to 127 and Subareas 12-5 to 12-16)
  - 157 Salmon Area H (Areas 12 to 19, 28 and 29)
  - 1 no area defined
- 276 Salmon Seine licences
  - 109 Salmon Area A (Areas 1 to 10)
  - 167 Salmon Area B (Areas 11 to 29 and 121)
- Season is variable depending on area and species

APPENDIX D - TABLES

ZN

INSIDE ZN - Inside Waters (Area 4B)

	QUOTA (tonnes)(a)			RETAINED CATCH (Tonnes)(b)			Estimated Release Rate(c)		Estimated Releases (tonnes)(d)			Estimated Retained and Released Catch (tonnes) (e)		
	Inshore		Aggs.	Inshore		Aggs.		Aggs.	Inshore		Aggs.	Inshore		Aggs.
YEAR	Rockfish	YE	1 & 2	Rockfish	YE	1 & 2	YE	1 & 2	Rockfish	YE	1 & 2	Rockfish	YE	1 & 2
2001	125	23	102	127.15	24.43	102.72	4%	14%	17.74	1.02	16.72	144.9	25.45	119.44
2000	125	23	102	126.1	24	102.1	4%	14%	17.82	1.00	16.82	143.7	25.00	118.72
1999	125	23	102	129.4	23.7	105.7	4%	14%	18.19	0.99	17.21	147.6	24.69	122.91
1998	153	23	130	157.2	25.7	131.5	4%	14%	22.46	1.07	21.41	179.7	26.77	152.91

OUTSIDE ZN - Outside Waters

		QUOTA (tonnes)(a)			RETAINED CATCH (Tonnes)(b)			Estimated Release Rate(c)		Estimated Releases (tonnes)(d)			Estimated Retained and Released Catch (tonnes) (e)		
		Inshore		Aggs.	Inshore		Aggs.		Aggs.	Inshore		Aggs.	Inshore		Aggs.
Year	Area	Rockfish	YE	1 & 2	Rockfish	YE	1 & 2	YE	1 & 2	Rockfish	YE	1 & 2	Rockfish	YE	1 & 2
2001/2002(f)	QCI	67	46	21	38.69	32.23	5.86	4%	14%	2.30	1.34	0.95	40.4	33.57	6.81
	PR	64	27	37	10.3	1.94	8.36	4%	14%	1.44	0.05	1.39	11.7	2.02	9.72
	CC	141	71	70	92.95	49.59	51.78	4%	14%	10.12	1.69	8.43	103.5	42.28	80.19
	WCVI	192	97	95	188.95	94.54	93.81	4%	14%	19.21	3.94	15.27	207.8	98.48	109.08
	Total	464	241	223	329.89	188.3	159.79			33.07	7.05	26.01	362.2	176.35	185.80
2000/2001	QCI	79	58	21	65.2	61.5	6.7	4%	14%	3.65	2.95	1.08	71.9	64.06	7.79
	PR	63	27	36	60.4	21.2	39.2	4%	14%	7.26	0.88	6.38	67.7	22.08	45.58
	CC	143	73	70	145.5	84.6	60.9	4%	14%	15.86	2.69	13.17	161.4	87.29	94.07
	WCVI	191	95	96	186	95.6	90.4	4%	14%	18.70	3.99	14.72	204.7	99.58	105.12
	Total	476	253	223	460.1	242.9	217.2			45.46	10.12	35.35	505.6	253.02	252.56
1999/2000	QCI	112	91	21	109.5	89.1	20.4	4%	14%	7.03	3.71	3.32	116.5	92.81	23.72
	PR	63	27	36	61.7	25.9	36.8	4%	14%	9.82	1.08	8.84	69.6	26.98	41.74
	CC	156	86	70	152.8	82.7	70.1	4%	14%	14.86	3.45	11.41	167.7	86.16	81.51
	WCVI	207	111	96	196.1	107.5	88.6	4%	14%	19.23	4.46	14.75	217.3	111.98	106.35
	Total	538	315	223	522.1	305.1	217			48.04	12.71	35.33	570.1	317.81	252.33
1998/1999	QCI	155	117	38	151.4	115.3	36.1	4%	14%	10.89	4.80	5.89	162.1	120.10	41.99
	PR	83	32	51	82.6	35.2	47.4	4%	14%	9.16	1.47	7.72	91.8	36.67	55.12
	CC	199	99	100	198.3	95.1	103.2	4%	14%	20.76	3.96	16.80	219.1	99.06	120.00
	WCVI	366	133	133	284	144.5	139.5	4%	14%	28.73	6.02	22.71	312.7	150.52	162.21
	Total	703	381	322	716.3	390.1	326.2			69.36	16.25	53.10	785.7	406.35	379.30

(a) The quota values originate from the ZN Integrated Fisheries Management Plans and Catch Reports provided by Archipelago Marine Research Ltd.

(b) The retained catch values originate from Dock Side Monitoring Program data

(c) The release rates for the ZN fishery are based on at-sea observer data and is cited in the 2001 PSARC Inshore Rockfish stock assessment. The 4% release rate for yelloweye is based on a 4% observed release rate of rockfish during directed ZN fishing using longline gear. This correlation has been made because longline gear is utilised for directed yelloweye fishing. The 14% release rate for aggregates 1 and 2 is based on a 14% observed release rate of rockfish during directed ZN fishing using handline gear. This correlation was made because handline gear is utilised, for the most part, for directed aggregate 1 and 2 fishing.
There is no at-sea observer coverage for the Inside ZN fishery in Area 4B. To make a 'best estimate' of releases the estimated outside ZN release rate has also been used for the Inside Zn fishery operating in Area 4B.

(d) Estimated releases are calculated by dividing the retained catch by (100%-release rate%) and then subtracting the retained catch. Therefore, Estimated releases =retained catch/(100%-release rate%)-retained catch

(e) Estimated retained and released catch is calculated by adding the estimated releases to the retained catch

(f) ZNO fishery is not terminated for the 2001/2002 season. Data is accurate as of January 29, 2002

RECREATIONAL - INSIDE WATERS

2000 & 2001 STRAIT OF GEORGIA CREEL SURVEY ESTIMATES

AREA	Estimated Retained Catch Aggs. 1 & 2 (pieces)(a)	Estimated Retained Catch Aggs. 1 & 2 (tonnes)(a)	Estimated Retained Catch Yelloweye (pieces)(a)	Estimated Retained Catch Yelloweye (tonnes)(a)	Estimated Retained Catch Inshore Rockfish (tonnes)(a)	Estimated Releases Aggs 1 & 2 (pieces)	Estimated Releases Yelloweye (pieces) (a)	Estimated Releases Aggs 1 & 2 (tonnes)	Estimated Releases Yelloweye (tonnes) (a)	Estimated Retained Catch + Releases Yelloweye (tonnes)(c)	Estimated Retained Catch + Releases Aggs 1 & 2 (tonnes)(c)
12	5253	3.68	1486	1.04	4.72	1605.00	0.00	1.12	0.00	1.04	4.80
13	10249	7.17	380	0.27	7.44	1779.00	5.00	1.25	0.00	0.27	8.42
14	1403	0.98	378	0.26	1.25	765.00	17.00	0.54	0.01	0.28	1.52
15	347	0.24	193	0.14	0.38	537.00	38.00	0.38	0.03	0.16	0.62
16	18724	13.11	2118	1.48	14.59	1679.00	30.00	1.18	0.02	1.50	14.28
17	4321	3.02	782	0.55	3.57	1551.00	93.00	1.09	0.06	0.61	4.11
18	929	0.65	18	0.01	0.66	272.00	1.00	0.19	0.00	0.01	0.84
19	5345	3.74	367	0.26	4.00	1048.00	112.00	0.73	0.08	0.34	4.48
20	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	2450	1.72	65	0.05	1.76	470.00	0.00	0.33	0.00	0.05	2.04
29	1063	0.74	64	0.04	0.79	286.00	0.00	0.20	0.00	0.04	0.94
	50084	35.06	5851	4.10	39.15	9992.00	286.00	6.99	0.20	4.30	42.05
12	2036	1.43	728	0.51	1.93	461.00	28.00	0.32	0.02	0.53	2.46
13	10487	7.34	759	0.53	7.87	1070.00	14.00	0.75	0.01	0.54	8.41
14	4612	3.23	1173	0.82	4.05	212.00	138.00	0.15	0.10	0.92	4.97
15	379	0.27	561	0.39	0.66	612.00	13.00	0.43	0.01	0.40	1.06
16	8334	5.83	3712	2.60	8.43	1421.00	27.00	0.99	0.02	2.62	11.05
17	10142	7.10	878	0.61	7.71	9112.00	71.00	6.38	0.05	0.66	8.38
18	2515	1.76	25	0.02	1.78	616.00	0.00	0.43	0.00	0.02	1.80
19	7741	5.42	151	0.11	5.52	266.00	15.00	0.19	0.01	0.12	5.64
20	126	0.09	17	0.01	0.10	0.00	0.00	0.00	0.00	0.01	0.11
28	4229	2.96	0	0.00	2.96	1458.00	0.00	1.02	0.00	0.00	2.96
29	1206	0.84	215	0.15	0.99	114.00	0.00	0.08	0.00	0.15	1.15
	51807	36.26	8219	5.75	42.02	15342.00	306.00	10.74	0.21	5.97	47.99

ESTIMATES PROJECTED FOR FULL CALENDAR YEAR

Estimated Retained Catch + Releases Yelloweye (tonnes)(f)	Estimated Retained Catch + Releases Aggs 1 & 2 (tonnes)(f)	Estimated Retained Catch + Releases Inshore Rockfish (tonnes)
1.09	5.04	6.13
0.28	8.84	9.12
0.29	1.59	1.88
0.17	0.65	0.82
1.58	15.00	16.57
0.64	4.32	4.96
0.01	0.88	0.90
0.35	4.70	5.05
0.00	0.00	0.00
0.05	2.15	2.19
0.05	0.99	1.04
4.51	44.16	48.67
0.56	2.59	3.14
0.57	8.83	9.40
0.96	5.22	6.18
0.42	1.11	1.53
2.75	11.60	14.35
0.70	8.80	9.49
0.02	1.89	1.90
0.12	5.92	6.04
0.01	0.12	0.13
0.00	3.11	3.11
0.16	1.20	1.36
6.27	50.38	56.65

(a) The Strait of Georgia Creel Survey is the source for recreational catch (retained and released) in inside waters. The creel survey does not cover the full calendar year. In 2000 the months April to December were covered. In 2001 the months April to October were covered.

(b) Pieces are converted to tonnes by multiplying the number of pieces by 0.7 kg. And then converting from kilograms to tonnes. This conversion formula is based on the method utilised in the 2001 PSARC Inshore Rockfish stock assessment.

(c) Estimated retained and released catch is calculated by adding the estimated releases to the estimated retained catch.

(f) Retained and released estimates were projected for a full calendar year by examining years in which the months November to March were included in the creel survey. The percentage of rockfish encounters during these months were estimated at 5% of the annual rockfish encounters. Therefore an expansion ration of 1.05 has been used to estimate recreational rockfish catch for a full calendar year.

RECREATIONAL - WCVI

2000 & 2001 WCVI CREEL SURVEY ESTIMATES

	AREA	Estimated Retained Catch Aggs. 1 & 2 (pieces)[a]	Estimated Retained Catch Aggs. 1 & 2 (tonnes)[b]	Estimated Retained Catch Yelloweye (pieces)[a]	Estimated Retained Catch Yelloweye (tonnes)[b]	Estimated Retained Catch Inshore Rockfish (tonnes)[b]	Estimated Releases Aggs 1 & 2 (pieces)[a]	Estimated Releases Yelloweye (pieces)[a]	Estimated Releases Aggs 1 & 2 (tonnes)[b]	Estimated Releases Yelloweye (tonnes)[b]	Estimated Retained Catch + Releases Yelloweye (tonnes)[d]	Estimated Retained Catch + Releases Aggs 1 & 2 (tonnes)[b]	ESTIMATES PROJECTED FOR FULL CALENDAR YEAR: Estimated Retained Catch + Releases Yelloweye (tonnes)[d][f]	Estimated Retained Catch + Releases Aggs 1 & 2 (tonnes)[d][f]	Estimated Retained Catch + Releases Inshore Rockfish (tonnes)
2000	121	6	0.00	126	0.09	0.09	0.00	36.00	0.00	0.03	0.11	0.00	0.14	0.01	0.15
	123	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	21	360	0.25	91	0.06	0.32	23.00	0.00	0.02	0.00	0.06	0.27	0.09	0.34	0.41
	23	840	0.59	328	0.23	0.82	196.00	0.00	0.14	0.00	0.23	0.73	0.29	0.91	1.19
	24	357	0.25	213	0.15	0.40	0.00	39.00	0.00	0.03	0.18	0.25	0.22	0.31	0.53
	25	246	0.17	1160	0.81	0.98	43.00	20.00	0.03	0.01	0.83	0.20	1.03	0.25	1.28
	26	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1808	1.27	1918	1.34	2.61	262.00	95.00	0.18	0.07	1.41	1.45	1.78	1.81	3.57
2001	121	93	0.07	21	0.01	0.08	0.00	0.00	0.00	0.00	0.01	0.07	0.02	0.08	0.10
	123	164	0.11	27	0.02	0.13	0.00	0.00	0.00	0.00	0.02	0.11	0.02	0.14	0.17
	124	282	0.20	94	0.07	0.26	4.00	0.00	0.00	0.00	0.07	0.20	0.09	0.25	0.33
	125	455	0.32	1250	0.88	1.19	114.00	0.00	0.08	0.00	0.88	0.40	1.09	0.50	1.58
	126	0	0.00	17	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01
	21	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	1110	0.78	31	0.02	0.80	182.00	0.00	0.13	0.00	0.02	0.90	0.03	1.13	1.16
	24	443	0.31	8	0.01	0.32	14.00	0.00	0.01	0.00	0.01	0.32	0.01	0.40	0.41
	25	166	0.12	498	0.35	0.46	44.00	7.00	0.03	0.00	0.35	0.15	0.44	0.19	0.63
	26	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	3006	2.11	2435	1.70	3.81	0.00	95.00	0.00	0.07	1.77	2.11	2.21	2.63	4.85
		5723	4.01	4379	3.07	7.07	368.00	102.00	0.25	0.07	3.14	4.26	3.92	5.32	9.24

[a] The West Coast Vancouver Island Creel Survey is the source for recreational catch (retained and released) in outside waters. The creel survey does not cover the full calendar year - June to September are included in the survey.
The North Coast Creel Survey estimates and lodge estimates have not been included in the estimates for recreational catch (retained and released) of inshore rockfish in outside waters. Including this data could expand the catch numbers by more than 30%.

[b] Pieces are converted to tonnes by multiplying the number of pieces by 0.7 kg. And then converting from kilograms to tonnes. This conversion formula is based on the method utilised in the 2001 PSARC Inshore Rockfish stock assessment.

[d] Estimated retained and released catch is calculated by adding the estimated releases to the estimated retained catch.

[f] To expand the creel data to fill a full calendar year required estimating the percentage of recreational rockfish catch (retained and released) that occurs in the months June to September. Virtually no data exists outside of these months for outside waters.
Therefore the ratio of catch for June to September from the more complete Strait of Georgia data was used as a proxy for the outside waters. The percentage of rockfish encounters during these months in the Strait of Georgia is 75% of the annual rockfish encounters.
Therefore an expansion ration of 1.25 has been used to expand the creel data to cover a full calendar year.

HALIBUT (L)

HALIBUT ROCKFISH BYCATCH 1996 to 2001 (INSIDE WATERS)

	Retained Catch (tonnes) (a)			Estimated Release Rate (b)		Estimated Releases (tonnes) (c)			Estimated Retained Catch + Releases (tonnes) (d)		
YEAR	Yelloweye	Aggs. 1 & 2	Inshore Rockfish	Yelloweye	Aggs. 1 & 2	YE	Aggs. 1 & 2	Inshore Rockfish	YE	Aggs. 1 & 2	Inshore Rockfish
2001	0.83	0.17	1	27%	12%	0.31	0.02	0.33	1.14	0.19	1.3
2000	0.44	0.04	0.48	27%	12%	0.16	0.01	0.17	0.60	0.05	0.6
1999	1.57	0.08	1.65	27%	12%	0.58	0.01	0.59	2.15	0.09	2.2
1998	6.33	0.15	6.48	27%	12%	2.34	0.02	2.36	8.67	0.17	8.8
1997	3.76	0.01	3.77	27%	12%	1.39	0.00	1.39	5.15	0.01	5.2
1996	5.75	0.26	6.01	27%	12%	2.13	0.04	2.16	7.88	0.30	8.2

HALIBUT ROCKFISH BYCATCH 1997 to 2001 (OUTSIDE WATERS) (e)

Year	Yelloweye (tonnes)	Aggs. 1 & 2 (tonnes)	Halibut (tonnes)	Yelloweye Bycatch (%)	Aggs. 1 & 2 Bycatch (%)	Total Rockfish Bycatch (%)
2001	240.2	12.5	4636	5.2%	0.3%	11.9%
2000	221.2	12.0	4832	4.6%	0.2%	9.4%
1999	117.3	5.6	5552	2.1%	0.1%	4.0%
1998	248.2	8.6	5859	4.2%	0.1%	5.5%
1997	203.9	8.9	5601	3.6%	0.2%	5.1%

HALIBUT ROCKFISH BYCATCH - OUTSIDE WATERS 2001 (f)

	QUOTA (tonnes)					RETAINED CATCH (tonnes)			ESTIMATED RELEASE RATE (b)		ESTIMATED RELEASES (c) (tonnes)			ESTIMATED RETAINED CATCH + RELEASES (tonnes)		
Area	Halibut Yelloweye	Option D Yelloweye	Halibut Aggs. 1&2	Option D Aggs. 1&2	Inshore Rockfish	Yelloweye	Aggs. 1&2	Inshore Rockfish	Yelloweye	Aggs. 1&2	Yelloweye	Aggs. 1&2	Inshore Rockfish	Yelloweye	Aggs. 1&2	Inshore Rockfish
QCI	101	67	24	9	201	145.6	5.73	151.33	27%	12%	53.85	0.78	54.63	199.45	6.51	206.0
PR	12	10	3	1	26	9.97	1.83	11.8	27%	12%	3.69	0.25	3.94	13.66	2.08	15.7
CC	22	18	3	1	44	37.47	2.33	39.8	27%	12%	13.86	0.32	14.19	51.33	2.65	54.8
WCVI	34	28	6	2	70	45.79	2.35	48.15	27%	12%	16.94	0.32	17.25	62.73	2.68	65.4
Total	169	123	36	13	341	238.83	12.25	251.08			88.33	1.67	90.00	327.16	13.92	341.1

(a) Retained catch is is based on Dockside Monitoring data.

(b) Release rate estimates are based on at-sea observer coverage and were used in the 2001 *PSARC Inshore Rockfish stock assessment*. An estimated 73% of yelloweye, 78% of of quillback and 64% of copper are landed in the halibut fishery. Because quillbacks constitute the majority of Aggregates 1 & 2 landed in the halibut fishery I have used the 78% value for quillbacks for the whole of Aggregates 1 & 2.

(d) Estimated releases are calculated by dividing the retained catch by [100%-release rate%] and then subtracting the retained catch. Therefore, Estimated releases =retained catch/[100%-release rate%]-retained catch

(e) This table is based on the Halibut In-Season data Summary found in the Halibut Home page - http://www.pac.dfo-mpo.gc.ca/ops/fm/Groundfish/Halibut/Default.htm

(f)This table is based on the Halibut Rockfish Bycatch vs TACs table found in the Halibut Home page - http://www.pac.dfo-mpo.gc.ca/ops/fm/Groundfish/Halibut/Default.htm

LINGCOD

2001 Directed Lingcod Inshore Rockfish Bycatch (a)

Encountered Lingcod (tonnes)	Encountered Yelloweye (tonnes)	Encountered Aggs. 1 & 2 (tonnes)	Yelloweye Bycatch %	Aggs. 1 & 2 Bycatch %	Inshore Rockfish Bycatch %
494.6	8.2	1.8	1.66%	0.36%	2.02%

Lingcod Fishery & Inshore Rockfish Bycatch

	Area	Inshore Rockfish TAC (tonnes)	Lingcod TAC (tonnes)	Landed Lingcod (tonnes)(b)	Estimated Encounter Rate Yelloweye(b)	Estimated Encounter Rate Aggs. 1 & 2(b)	Estimated Encounters Yelloweye (tonnes)(c)	Estimated Encounters Aggs. 1 & 2 (tonnes)(c)	Estimated Encounters Inshore Rockfish (tonnes)
2001/2002	Area 3C	0	150	150.5	1.7%	0.4%	2.56	0.60	3.16
	Area 3D	0	180	175.8	1.7%	0.4%	2.99	0.70	3.69
	Area 5AB	0	200	221.9	1.7%	0.4%	3.77	0.89	4.66
	Area 5CDE	0	420	412.8	1.7%	0.4%	7.02	1.65	8.67
	Totals	0	950	961			16.34	3.84	20.18
2000/2001	Area 3C	0	150	156.4	1.7%	0.4%	2.66	0.63	3.28
	Area 3D	0	180	218.9	1.7%	0.4%	3.72	0.88	4.60
	Area 5AB	0	200	194	1.7%	0.4%	3.30	0.78	4.07
	Area 5CDE	0	420	435.4	1.7%	0.4%	7.40	1.74	9.14
	Totals	0	950	1004.7			17.08	4.02	21.10
1999/2000	Area 3C	0	150	139.9	1.7%	0.4%	2.38	0.56	2.94
	Area 3D	0	180	198	1.7%	0.4%	3.37	0.79	4.16
	Area 5AB	0	200	201.6	1.7%	0.4%	3.43	0.81	4.23
	Area 5CDE	0	420	405	1.7%	0.4%	6.89	1.62	8.51
	Totals	0	950	944.5			16.06	3.78	19.83
1998/1999	Area 3C	0	150	145.7	1.7%	0.4%	2.48	0.58	3.06
	Area 3D	0	180	185.6	1.7%	0.4%	3.16	0.74	3.90
	Area 5AB	0	200	197.3	1.7%	0.4%	3.35	0.79	4.14
	Area 5CDE	0	420	281.2	1.7%	0.4%	4.78	1.12	5.91
	Totals	0	950	809.8			13.77	3.24	17.01

(a) Bycatch calculations were based on 2001 logbook data for the directed lingcod fishery. Logbook data rather than at-sea observer coverage data because the percentage of coverage in the directed lingcod fishery was 0.5%. The at-sea observer data indicated a 1.1% yelloweye encounter rate and a 0.02% aggregates 1 & 2 encounter rate. Aggregates 1 & 2 include quillback, copper, china, and tiger rockfish.

(b) Landed lingcod estimates are based on Dockside Monitoring Program data.

(c) Encounter estimates were calculated by multiplying the value of landed lingcod by the encounter rate estimate of yelloweye and aggregates 1 & 2.

DOGFISH

2001 Directed Dogfish Inshore Rockfish Bycatch (a)

Retained Dogfish (tonnes)	Released Yelloweye (tonnes)	Released Aggs. 1 & 2 (tonnes)	Yelloweye Bycatch %	Aggs. 1 & 2 Bycatch %	Inshore Rockfish Bycatch %
69756	30	509	0.04%	0.73%	0.77%

Dogfish Fishery and Inshore Rockfish Bycatch - Inside Waters

Year	Inshore Rockfish TAC (tonnes)	Dogfish TAC (tonnes)	Landed Dogfish (tonnes)	Estimated Encounter Rate Yelloweye	Estimated Encounter Rate Aggs. 1 & 2	Estimated Encounters Yelloweye (tonnes)	Estimated Encounters Aggs. 1 & 2 (tonnes)	Estimated Encounters Inshore Rockfish (tonnes)
2001/2002 (b)	0	3,400	939.50	0.04%	0.73%	0.38	6.86	7.23
2000/2001	0	3,400	1,077.90	0.04%	0.73%	0.43	7.87	8.30
1999/2000	0	3,400	1,904.60	0.04%	0.73%	0.76	13.90	14.67
1998/1999	0	3,400	827.70	0.04%	0.73%	0.33	6.04	6.37

Dogfish Fishery and Inshore Rockfish Bycatch - Outside Waters

Year	Inshore Rockfish TAC (tonnes)	Dogfish TAC (tonnes)	Landed Dogfish (tonnes)	Estimated Release Rate Yelloweye	Estimated Release Rate Aggs. 1 & 2	Estimated Encounters Yelloweye (tonnes)	Estimated Encounters Aggs. 1 & 2 (tonnes)	Estimated Encounters Inshore Rockfish (tonnes)
2001/2002 (b)	0	8,100	2,745.90	0.04%	0.73%	1.10	20.05	21.14
2000/2001	0	8,100	3,356.40	0.04%	0.73%	1.34	24.50	25.84
1999/2000	0	8,100	1,904.60	0.04%	0.73%	0.76	13.90	14.67
1998/1999	0	8,100	1,299.80	0.04%	0.73%	0.52	9.49	10.01

(a) Encounter rate estimates are based on 2001 Hook and Line Groundfish At-Sea Observer Program data

(b) The 2001/2002 Dogfish season has not terminated - data is accurate as of January 29, 2002.

(b) Landed dogfish estimates are based on Dockside Monitoring Program data

(c) Encounter estimates are calculated by multiplying the value of landed dogfish by the encounter rate estimate of yelloweye and aggregates 1 & 2