

Submission on the Proposed Rockfish Conservation Area Strategy

A submission from:

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1 Executive Summary

1. There is tremendous uncertainty associated with the management of inshore rockfish fisheries.
2. A well-designed network of Rockfish Conservation Areas (RCAs) is an effective way of dealing with uncertainty while providing additional fisheries benefits.
3. Global research indicates that ecological considerations must be a priority in the establishment of marine reserve networks.
4. The current RCA process largely ignores the accepted methods for marine reserve identification and selection. The 144 currently proposed RCAs were selected with no scientifically defensible criteria.
5. There are data and expertise available to Fisheries and Oceans Canada (DFO) to undertake this process in a scientifically defensible manner. The current suite of proposed RCAs should be put on hold until all high quality inshore rockfish habitats are identified as proposed RCAs. Ecological considerations such as bathymetry, currents, habitat complexity, and spatial fishing effort data must be an integral component for identifying potential RCAs.
6. The size, number, and distribution of RCAs cannot be evaluated without detailed knowledge of habitat. Consequently, estimating the percentage of RCA coverage is inappropriate until inshore rockfish habitat is aptly mapped.
7. Using alternative databases it was found that a large proportion of the RCAs are in areas of no known fisheries values which in turn questions the habitat value of many proposed RCAs. RCAs placed in inlets along the south coast of BC are of particular concern.
8. Due to all the uncertainties in inshore rockfish biomass and catch the harvest policy in open areas must be independent of RCAs.
9. We support a moratorium on all inshore rockfish harvest in the Strait of Georgia until such time when defensible biomass estimates exist and a habitat-based network of RCAs occupying 50% of rockfish habitat has been completed.
10. RCAs need to be established with consideration to other fisheries to avoid transference of fishing effort to other rockfish species.
11. A long-term monitoring system for evaluating and monitoring RCAs should be considered from the onset.

12. DFO needs to coordinate the RCA process with other marine protected area initiatives coast-wide, particularly the Rockfish Protection Areas (RPA) process.
13. Of the 116 newly proposed RCAs determined by DFO as a basis for public consultation, 92 were selected by the Sports Fishing Advisory Board (SFAB) and 24 by the Groundfish Hook and Line Advisory Committee (GHLAC) (Source: DFO database). The problem with this procedure is that social, political and economic factors automatically override biological criteria. This is not an appropriate starting point for a large-scale system of marine reserves as some of the best potential RCA sites are not considered before the process has even begun.
14. A workshop with well-defined terms of reference should be organized with the sole objective of developing a habitat-based system for RCA identification.
15. A poorly designed marine reserve system could lead to over-fishing outside of the reserve area.
16. RCAs should be established for scientifically defensible conservation purposes and in a manner that is consistent with First Nations constitutional and treaty rights.

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2 Preamble

A century of industrial fishing in British Columbia (BC) has resulted in the depletion of numerous inshore rockfish populations. These fish are old-lived, slow maturing, and demonstrate episodic recruitment. Even in the best-case scenario, the partial recovery of inshore rockfish will be in the time scales of decades. Rockfish have been over-fished for a century; we should not expect recovery to be much faster. It is prudent to take some time at the front end of this recovery process to thoroughly design a network of rockfish conservation areas based on sound scientific and socio-economic principles.

3 Background

After decades of over-exploitation of inshore rockfish and failed management, the Department of Fisheries and Oceans (DFO) has started to address inshore rockfish conservation concerns. In December of 2001, Fisheries Minister Herb Dhaliwal announced DFO's commitment to address these concerns. A four-pronged approach to rockfish conservation was developed. This included a drastic reduction of rockfish harvest, the establishment of rockfish conservation areas (RCAs), improvements in catch monitoring, and a development of a stock assessment framework. Collectively these points formed the Rockfish Conservation Strategy (RCS) announced in May 2002.

Since December of 2001, total allowable catch (TAC) of inshore rockfish in the commercial fleet has been reduced by 50% for yelloweye rockfish and 46% for quillback, copper, China, and tiger rockfish. However, there are still many uncertainties involved with these reductions and with the management of inshore rockfish in general. This includes unknown biomass, unknown catches due to high discards and bycatch in commercial fleets, and unknown recreational catches. It is thought that the establishment of RCAs can help deal with these uncertainties and achieve other fisheries benefits (Parker et al. 2000). The selection process of RCAs and progress towards a defensible Closed Area Strategy (CAS) is the focus of this submission.

4 Review of Rockfish Conservation Area Selection

In 2002, using existing advisory processes, DFO held numerous public meetings coast-wide. From these meetings, 148 potential RCAs were suggested by interested parties. Thirty-two sites were selected and announced in August 2002 as RCAs. These sites were selected "because of all the sites, these were less contentious, i.e. First Nations, high sport value" (Logan pers. com. 2003). It was deemed to be more important to get the process rolling than be stifled by political controversy. Since the original announcement, four sites have been rescinded leaving 28 RCAs and 116 additional proposed sites.

On June 03, 2003 DFO announced that the remaining 116 sites will also be considered as RCAs as part of the *Closed Area Strategy* (Appendix 2). DFO has called for public comment on the existing and proposed RCAs. This document was prepared for the Sierra Club of Canada (B.C. Chapter), in collaboration with the Living Oceans Society and consultation with the Canadian Parks and Wilderness Society and Watershed Watch, as a response to DFO's invitation for comment.

5 Purpose of the Submission

The current public consultation process is primarily intended for interested parties to comment on individual candidate RCAs. This submission does not examine each candidate RCA. We are interested in whether or not the *Closed Area Strategy* as a whole is progressing in a manner that will meet the stated conservation objectives of: (1) protecting rockfish habitat; (2) providing a buffer against scientific uncertainty; (3) protecting and rebuilding of rockfish stocks; and (4) minimizing mortality from directed and incidental fisheries.¹

We have reviewed the current approach to implementing RCAs, and have concluded that it is proceeding in a direction that discounts the basic principles of marine reserve design. Consequently, it is probable that the stated objectives will not be met.

6 Problems with Current Process

6.1 Lack of a Scientific Approach

“Reserves whose objectives include conservation or fishery functions must have a solid foundation in biology to succeed. A reserve with little biological value will provide few benefits, just as a bank account with little money will yield almost no interest. Thus biological evaluation should generally precede and inform social and economic evaluation of potential reserve sites.” (Roberts et al. 2003a)

Establishing a system of RCAs to achieve the multiple conservation objectives of stock rebuilding, harvest control, and insurance against uncertainty in fisheries management is a complex task. Over the last decade there has been considerable international scientific investigation into the proper design of marine reserve networks (Yoklavich 1998). In February of 2003, the scientific journal *Ecological Applications* devoted an entire issue to marine reserve design. It is well understood that the complexity of marine systems coupled with the lack of appropriate information precludes the notion of a perfectly designed system of RCAs. In the face of such complexity, the research community has developed principles that when applied properly are thought to best deal with the uncertainty and provide the greatest likelihood of achieving the desired outcomes of a reserve strategy.

The Department of Fisheries and Oceans’ current approach to developing a system of RCAs has largely side-stepped the scientifically accepted approaches to marine reserve design. Of the 116 newly proposed RCAs determined by DFO as a basis for public consultation 92 were selected by recommendation from the Sports Fishing Advisory Board (SFAB) and 24 by the Groundfish Hook and Line Advisory Committee (GHLAC) (Source: DFO RCA GIS database). The problem with this procedure is that social, political and economic factors automatically override biological criteria. This is not an appropriate starting point for a large-scale system of marine reserves as some of the best potential RCA sites are not considered before the process has even begun.

A quick look at proposed sites clearly indicates the lack of a systematic approach. There has been insufficient thought given to size, geographic location, habitat, fisheries benefits, or quantity. Many areas of the coast are virtually ignored. For example, only two of the 144 proposed areas are in the Haida Gwaii region whereas there are 118 areas found in the Strait of Georgia groundfish

¹ Objectives from Ministerial press releases.

management region (Figure 1).² Yamanaka and Lacko (2001) recognized that the Strait of Georgia management region is a greater conservation concern, and perhaps more of an immediate focus, but not to this degree. The imbalance of numbers simply reflects the ad hoc politicized public process used to identify sites.

The DFO justification for this process is that it is a testing ground for the process of implementing RCAs, and that future objectives include developing “a process to identify additional areas” (DFO 2003). Granted there is a rationale for testing a process, but the basis must still be defensible.

The system needs to be based on sound ecological principles while including public involvement from the onset. The current process of RCAs seems to be based on the assumption that any RCA is better than no RCA. This is an indefensible approach, which has the potential to do more harm than good to inshore rockfish populations in the long-term. A poorly designed system will give a false sense of security that they are protecting the stock and may result in a slackening of other control measures (i.e., catch limits, harvest rates, seasonal closures, etc.). Furthermore, groups opposed to the creation of RCAs will use the existence of established RCAs as reason to denounce subsequent ones. Finally, if no defensible conservation objective is served, then there will be no lawful means to restrain aboriginal fisheries within any RCAs.

6.2 Pre-requisite Criteria

Before proceeding with the next stages of this process, a systematic approach needs to be developed which identifies hundreds of potential RCAs coast-wide based on representative habitats, bathymetry, oceanography, connectivity, past fishing effort, fisheries potential, and inshore rockfish life history. Furthermore, the reserves should be distributed in a network which increases the probability of replenishment of one by another.

There has been considerable research undertaken to establish criteria for marine reserves. It is accepted by the international research community that a systematic approach that places ecological considerations ahead of social, economic, and political ones is a necessary starting point. Roberts et al. (2003b) suggest that marine reserve selection falls into three types of criteria: (1) prerequisite; (2) excluding; and (3) modifying. *Prerequisite criteria* are those that are critical for achieving reserve objectives (i.e., representative habitats) and cannot be compromised. *Excluding criteria* are those that are used to exclude a proposed area from further consideration (i.e., uncontrollable human threat or natural disturbance). *Modifying criteria* are those where there are degrees of suitability (e.g., distance between reserves, size of reserve, etc.). Final designations will need to include socio-economic, monitoring, and enforcement considerations. It is only after ecological criteria have been identified that public consultation should be undertaken as a necessary step towards a successful reserve system. As a starting point, social factors should not override ecological ones.

On the Pacific coast of North America there are other jurisdictions presently involved with the establishment of marine reserve networks that may be drawn upon for guidance. In particular the State of California Department of Fish and Game has developed a habitat-based approach for identifying and implementing marine reserves. Most, if not all, of the information required to initiate a similar habitat-based network of rockfish reserves in BC is already available to DFO (Table 1). The

² The Strait of Georgia groundfish management region is comprised of the Strait of Georgia and the south Central Coast regions.

suggested themes in Table 1 are essential starting points. Once suitable areas are identified based on pre-requisite criteria, excluding and modifying criteria can be applied for final selection.

Table 1: Possible theme layers used to design a marine reserve system for inshore rockfish.

Theme Required	Available in British Columbia?	Comment
Spatial fishing effort	YES (partially used already)	Spatial fishing effort is available from commercial logbook data. Each of the 148 candidate sites has been given a 'Rockfish Value' of High, Medium, or Data Limited. The value is based on their relative level of rockfish catch derived from fishing effort in commercial and recreational fisheries.
Bathymetry	YES	Several datasets available to DFO: including Nautical Data International (NDI) Natural Resource Maps, and vector charts; CHS soundings; NRC soundings; etc.
Substrate	YES	BC Marine Ecological Classification divided substrate into hard, sand, mud, and unknown. Natural Resources Canada has done additional multibeam surveys in Hecate Strait and the Strait of Georgia. There are additional CHS chart data available from field sheets.
Currents	YES	Excellent 3-D current modeling for BC has been carried out at the Institute of Ocean Sciences.
Complexity	YES	Living Oceans Society has developed a surrogate measure for identifying rockfish habitat using a bathymetry based algorithm to determine topological complexity, combined with depth and vegetation layers (Ardron 2002).

Once all potential sites have been identified, public consultation can be undertaken with a system and plan in place. The logic would be as follows:

1. Rockfish are severely depleted and we need to rebuild their populations.
2. There is tremendous uncertainty associated with the management of rockfish.
3. Marine reserves are an increasingly utilized and proven tool to achieve fisheries benefits while dealing with uncertainty.
4. It is estimated that 20-50% of all rockfish habitat needs to be protected in a networked fashion.
5. We have identified all of the areas on BC's coast that are thought to be valuable rockfish habitat based on physical, ecological, and fisheries information.
6. It is necessary that between 20-50% of this habitat be placed into RCAs.
7. The public is invited to comment on these sites (similar to what is being undertaken at present time).
8. Final site selection will be based on a variety of factors including public input but based in a system with a conservation and rockfish restoration focus.

7 Modifying Criteria

7.1 How much area should be put into Rockfish Conservation Areas?

Yamanaka and Lacko (2001) recommended that 50% of inshore rockfish habitat in south coast inside waters and 20% coast-wide be placed into RCAs. While conservationists have supported these targets, in general, the conservation sector does not want to be locked into numeric limits. There is increasing scientific agreement that between 20% and 50% of habitat needs to be protected in order to achieve sustainable fishing objectives. Given all the uncertainty surrounding life history, catches, population size and structure, distribution, and diversity of species, a precautionary approach leads us to support this range as a reasonable objective coast-wide. At present time it is not possible to estimate the percentage of rockfish habitat protected simply because rockfish habitat has yet to be fully identified. Because of this shortcoming, there is no justification for determining the percentage of spatial coverage of RCAs as a measure of achieving inshore rockfish protection.

Although it is not possible at present time to calculate the amount of inshore rockfish habitat placed in RCAs, a spatial coverage analysis can bring to light some of the large-scale discrepancies between regions and can also be used to demonstrate how percentages can be misleading. For example, the south Central Coast region (all waters to 2000m) has 17.2% proposed RCA coverage (Figure 1). Under this scenario, it is possible that future RCA proposals in the south Central Coast may be met with increased opposition as opponents to RCAs may use the high observed percentage as a ceiling. A similar analysis, in the same region, using waters to 200m (the depth of primary inshore rockfish habitat) found that the percentage of RCA coverage actually decreased to 12.8% because 25% of the RCA coverage is in waters greater than 200m. Upon closer examination it is found that the discrepancies in numbers result primarily from three large proposed RCAs in Bute Inlet that extend beyond the 200m depth range (Bute Inlet North #128, Bute Inlet South #129, and Bute Inlet Cosmos Height #140). This example demonstrates the potential danger in assigning percentages under imperfect habitat knowledge.

Even without any knowledge of habitat quality and distribution, it is clear that the west coast of Vancouver Island, North Coast, and the Haida Gwaii regions are noticeably underrepresented at present time with 1.2%, 2.7%, and 2.1% RCA coverage respectively. Likewise, the north Central Coast may be the best represented so far (12%), though this would need to be verified using better habitat models and logbook data. This is mostly due to the Rockfish Protection Area (Kitasoo Bay / Laredo Inlet) that was transferred over to being an RCA.

Overall we recommend that no references to percentages be applied towards the 20-50% objectives until inshore rockfish habitat is accurately mapped.

7.2 Size of RCAs

Many factors influence the minimum size of an RCA required to meet the objectives. At very least the RCA should cover the known movement patterns of the species being protected. In the case of inshore rockfish, tagging studies of nearshore species show that movements from 2 to 100s of km are possible (Mathews 1990). The RCA system must look at minimum effective size to achieve desired objectives. Factors to be considered in the size include edge effects, migration, natural habitat boundaries, and social factors such as enforcement. When designing marine reserve systems,

it is generally accepted that a diversity of sizes is a good idea as both large and small reserves have their advantages and disadvantages.

The size distribution of the current suite of proposed RCAs appears to have a suitable diversity of size classes (Figure 2). Generally RCAs smaller than 1km² are not ideal candidates as they are not large enough to contain the known movements of most inshore rockfish species and enforcement of numerous small areas will be difficult. The Strait of Georgia groundfish management region has 14 RCAs under 1 km² that are likely too small to achieve significant ecological benefits. That being said, each one should still be judged based on its individual merits. The main obstacle to evaluating the size distribution is that the habitat quality of RCAs is unknown. Without knowing the habitat, it is possible for a 1km² RCA to have more habitat than one of 10km². For example, Bute Inlet has 3 proposed RCAs which collectively account for 237 km² or nearly a quarter of the spatial coverage of RCAs in the south Central Coast. Fjords are not typically considered to be prolific rockfish areas and therefore it is difficult to understand what is being protected. Overall it is not possible to comment on the appropriate size of RCAs without knowing the habitat features contained within the sites in question, adjacent habitat, and perimeter to area ratios. Once again this brings to light the importance of having a strong habitat-based system of RCAs from the onset.

7.3 Distribution of RCAs

The coast-wide distribution of RCAs influences the ability of the RCA system to achieve its varied objectives. A well-designed system would have RCAs of various shapes and sizes spread evenly throughout all identified rockfish habitat. The rationale for this strategy is to hedge against uncertainty and maximize connectedness (i.e., source-sink relationships).

The current suite of RCAs appears to be distributed in an ad hoc process whereby some regions appear to have a good distribution (under the assumption that the proposed RCAs are good rockfish habitat) whereas other regions have no distribution. Figure 1 highlights the discrepancy between regions. The Haida Gwaii region has only two RCAs and the entire North Coast has only three (Figure1). These regions also support the largest remaining populations of inshore rockfish on BC's coast.

8 Other Concerns Surrounding the RCA Process

8.1 RCAs and Harvest Rate Policy

At present time there is no policy to address the relationship between harvest rates and the spatial coverage of RCAs (Yamanaka, pers. com.). In 2001 Yamanaka and Lacko recommended that the decrease in catch in the open areas be “greater than the proportion of fishing area closed”. We support this recommendation. There has been proposals by DFO's management branch advocating a harvest policy where the harvest rate for inshore rockfish becomes proportional to the amount of area placed in RCAs. Under this scenario, the harvest rate outside of the RCAs would increase in proportion to total spatial coverage of RCAs. For a number of reasons, we advocate that there must be a sustainable catch rate in the fished areas that is independent of RCAs.

First, one of the primary objectives is to rebuild rockfish populations. If a sustainable harvest rate is applied that is directly proportional to the habitat put into RCAs, then in theory, this will simply maintain the population at current depleted levels and not allow for rebuilding of stocks. The open areas must stand alone as sustainable units and not rely on exports from the reserves.

Second, one of the primary stated objectives for RCAs is for dealing with the uncertainty surrounding rockfish populations. Since the biomass, sustainable harvest rate, and catches of inshore rockfish are unknown, a harvest rate based on the proportion of closed areas would negate their role as precautionary tools and as insurance policies. Until RCAs are properly monitored and shown to work as predicted, it is too risky to assume that RCAs are producing rockfish at equivalent rates.

Third, the RCA system as currently proposed has no ecological basis or evaluation method and therefore there is no defensible justification to increase harvest rates in open areas.

8.2 Spatial Distribution of Fishing Effort as a Surrogate for Habitat

Rockfish habitat is difficult to define as different rockfish species are found on essentially all habitat types and at all fishable depths. It would be useful to have a more comprehensive understanding of inshore rockfish habitat requirements throughout their life cycles, but unfortunately we do not. The spatial distribution of fishing effort is useful for identifying areas where rockfish are vulnerable to fishing pressure which in turn is a reasonable surrogate for much of the inshore rockfish habitat.

Based on the relative catch obtained from commercial logbooks, recreational fishing effort, and catch information collected from fisheries officers, the Closed Area Strategy (CAS) has started to identify the potential value of rockfish habitat in the proposed RCAs as *high*, *medium*, and *data limited*. To date, the use of this data in the RCA process has been limited to identifying the values in the proposed RCAs. We would like to see the spatial distribution of rockfish fishing effort as one of the main tools for identifying RCAs coast-wide. The current process only started to examine rockfish values after the sites were selected.

At present time, 63 of the proposed 144 RCAs are considered to be high rockfish value, 41 are medium rockfish value, and the remaining 40 sites are data limited. When examined by spatial coverage it is found that 74% of the areas are classified as high rockfish value, 16% as medium, and 10% as data limited. The percentage of high rockfish value areas is encouraging under the assumption that the data used for these designations is of sufficient quality. At this point there are still concerns regarding how the varied data sources (i.e., commercial, recreational, and fisheries officers) were integrated and utilized.

Many of the areas identified as 'high' rockfish value are inconsistent with other data sets. Figure 3 shows the distribution of high, moderate, and low use fishing areas in the south Central Coast based on data from DFO's Coastal Resource Inventory System (interviews with fisheries officers and managers) merged with Living Oceans Society Local Ecological Knowledge Project. According to these data, only 61% of the proposed RCAs overlap with known rockfish fishing areas. Of note are the RCAs in Bute, Loughborough, and Toba inlets which have little known fishing activity yet account for the bulk of the RCA coverage in this region. In the area bounded from Johnstone Strait

southwards it is found that only 18% of the RCAs overlap with known fishing areas. The result of this analysis raises concerns surrounding the basis in which the proposed RCAs were selected (i.e., fishing interests) and furthermore the criteria used to assign rockfish values.

A shortcoming of using only fisheries data is that it misses areas of suitable habitat that are not typically fished due to proximity to land, prevailing weather conditions, etc. Understanding the distribution of potential *de facto* reserve areas will eventually be important for conserving existing populations of inshore rockfish and for understanding how a network of RCAs may be designed.

Another concern with the use of fishing effort data is the possibility that many rockfish populations were already depleted prior to accurate spatial record keeping. It has been suggested by many marine reserve researchers that as part of the source-sink dynamic, protection needs to be in areas of historically high fish abundance and in areas of presently high fish abundance. Early logbook data and local fisheries knowledge will be critical for identifying historically important areas.

Overall, we agree that the fishing effort data, if collected and utilized properly, can provide useful information to the Closed Area Strategy and should be used as one of the main building blocks. Because of our noted concerns with the use of this data, we would appreciate the opportunity to review the source data ourselves or at least have detailed explanation as to how the rockfish values were assigned.

8.3 Permitted Fisheries in Rockfish Conservation Areas

For the reserves to achieve the desired goals, there can be no fisheries permitted that intentionally or inadvertently catch inshore rockfish. That means no groundfish harvest by hook and line, no trawling, and no salmon fishing. The current suite of commercial and recreational fisheries closures in RCAs are reasonable restrictions for achieving rockfish conservation goals with the exception of scallop trawling (see Appendix 1).

8.4 Transference of the Problem

A poorly designed marine reserve system could lead to over-fishing outside of the reserve area. This problem is one that must be addressed from the beginning. All aspects of the management system including harvest rates, closed areas, and seasonal closures must be considered in the planning of the RCAs.

A problem not often looked at, but present in the BC situation is the transference of fishing effort from inshore rockfish to other Pacific rockfish species. This problem will certainly arise in the halibut fishery if careful consideration is not given to RCA placement. The halibut fishery regularly catches all species of inshore rockfish as well as numerous other rockfish species that are even less understood and have no catch restrictions. Placement of RCAs which overlap with halibut fisheries will not only exert increased pressure on inshore rockfish outside of RCAs but will also increase fishing pressure on other rockfish species.

A well-designed RCA system can work towards minimizing interactions with other fisheries. Once all high value potential RCAs are identified, then it will be possible to find areas that provide inshore rockfish benefits while minimizing the impacts on other fisheries.

8.5 Evaluation and Monitoring

At the onset of RCA planning, the method of evaluating the success of the system needs to be in place. Some areas should be selected on the basis of their potential as research and monitoring areas. This includes selecting sites for statistical comparison, determining indicators, and determining reasonable performance objectives. Carr (1998) lists three potential problems that can arise with improper evaluation methods. First, with no evaluation, there may be an assumption that the reserves are working when in fact they may not be. This could lead to relaxed restrictions and increased fishing effort. Second, the reserve is working well, but the evaluation methods do not detect the positive change. Third, is the possibility that the reserve system is not working properly but the evaluation shows a positive effect.

The proposed 144 RCAs, having been derived from an indiscriminate methodology, have no basis for evaluation. As part of the RCA process there needs to be clear performance objectives and methods for evaluating success (e.g., increase in average rockfish size, abundance, age class distributions, etc.).

8.6 Coordination with other Jurisdictions and Marine Protected Area Initiatives

There are other agencies aside from DFO who are involved with the conservation and protection of marine resources. The RCA process has made no apparent attempt to collaborate despite having similar objectives and working in the same geographical areas. In particular DFO Marine Protected Areas, DFO Rockfish Protected Areas, Parks Canada's National Marine Conservation Areas, provincial Ecological Reserves, the Orca Pass International Stewardship Area, and Washington Department of Fish and Wildlife Puget Sound marine reserve network.

Collaboration with other agencies allows for additional objectives to be met including the protection of other species and habitats, political expediency, less draw on limited public resources, larger ecosystem-based approaches, fewer public processes, and less public confusion.

The exclusion of Rockfish Protection Areas (RPAs) from the RCA strategy is particularly disconcerting. In this case, we have the same federal department (DFO) trying to protect and restore the same assemblage of species (i.e., inshore rockfish), by the same technique (i.e., spatial reserves), but with different restrictions. The RPAs are closed to directed commercial fishing for inshore rockfish and lingcod but open to trawling and recreational fisheries for rockfish. Not only does this compromise anticipated biological benefits but also raises the issue of fairness between gear sectors. Significant advances towards a successful RCA network could be achieved by melding together these two processes. Figure 4 highlights the absurdity of having two systems of rockfish spatial reserves. At present time 11 of 18 RPAs overlap with existing RCAs.

8.7 Enforcement and Education

Illegal fishing is rampant coast-wide. Illegal fishing in RCAs can be lessened to some degree by strategic placement, education, and community acceptance of the RCA. Furthermore, fewer larger RCAs may be easier to enforce than many small ones.

9 Next Steps

1. **Moratorium:** At present time there is insufficient information to justify the directed harvest of inshore rockfish. The biomass is unknown, the catches are unknown, and consequently a sustainable harvest rate is unknown. There is evidence of severe depletions of rockfish in the Strait of Georgia (Statistical Areas 14-20, 28, 29 and Sub-Areas 13-1 to 13-5, and 13-15 to 13-21). For the Strait of Georgia, we support a moratorium on all inshore rockfish harvest in these statistical areas until such time when defensible biomass estimates exist and a habitat-based network of RCAs occupying 50% of rockfish habitat is established.

The conditions that would allow the continuation of directed rockfish fisheries do not exist, at present, for any of the fisheries management areas of the coast. These conditions include defensible biomass estimates and verifiable catch data. Over the past few years, reductions in catch limits, the establishment of RPAs and RCAs, and other such measures have had no significant effect in reducing harvest rates, or in preventing serial depletion of rockfish reefs. A mere continuation of that policy – reduce catch limits, establish small rockfish protection areas – would be an unacceptable continuation of the status quo. As advised by PSARC scientists, and as set out in CSAS Research Document 2001/139, the targets for the large-scale closed areas [should include] a “network” of harvest refugia in the Strait of Georgia Fisheries Management Area 4B - which takes in Johnstone Straits, the Strait of Georgia and adjacent areas – to encompass roughly 50 per cent of the known rockfish habitat types in the area, and ii) a similarly-designed network of harvest refugia to encompass a minimum of 20 per cent of the known rockfish habitat types elsewhere on the coast. These sub-areas must be closed to “all fishing” by all gear associated with both directed rockfish fishing and incidental rockfish encounters.

2. **Closed Area Strategy:** The Closed Area Strategy is progressing in a manner that does not make use of all available data and largely ignores the accepted principles of marine reserve design. The strategy needs to take a habitat-based representative approach to designing a network of RCAs. The current suite of proposed RCAs should be put on hold until a thorough analysis has been undertaken which identifies all suitable RCAs in the Strait and elsewhere on the coast.
3. **Workshop:** We suggest that a small workshop be held in January 2004 comprised of experts in marine reserve design, rockfish biology and management, marine reserve monitoring and habitat mapping. The outcome of the meeting being the basis for a system to identify future RCAs coast-wide and help select from the current suite of proposed RCAs.
4. **Co-ordination:** Work with other agencies and jurisdictions to identify areas of multiple interests. Merge together the RCA and RPA processes.
5. **Timeline:** By October 2004 have a proposed system of habitat-based RCAs ready for public consultation.

10 Closing Comments

In spite of all the concerns outlined in this document, we are encouraged that DFO is working towards a better management system for inshore rockfish populations. Although we disagree with the approach DFO has taken for selecting candidate RCAs we believe there is much common ground on overall objectives of this initiative and look forward to working more closely with the Department in the future.

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13 Figures

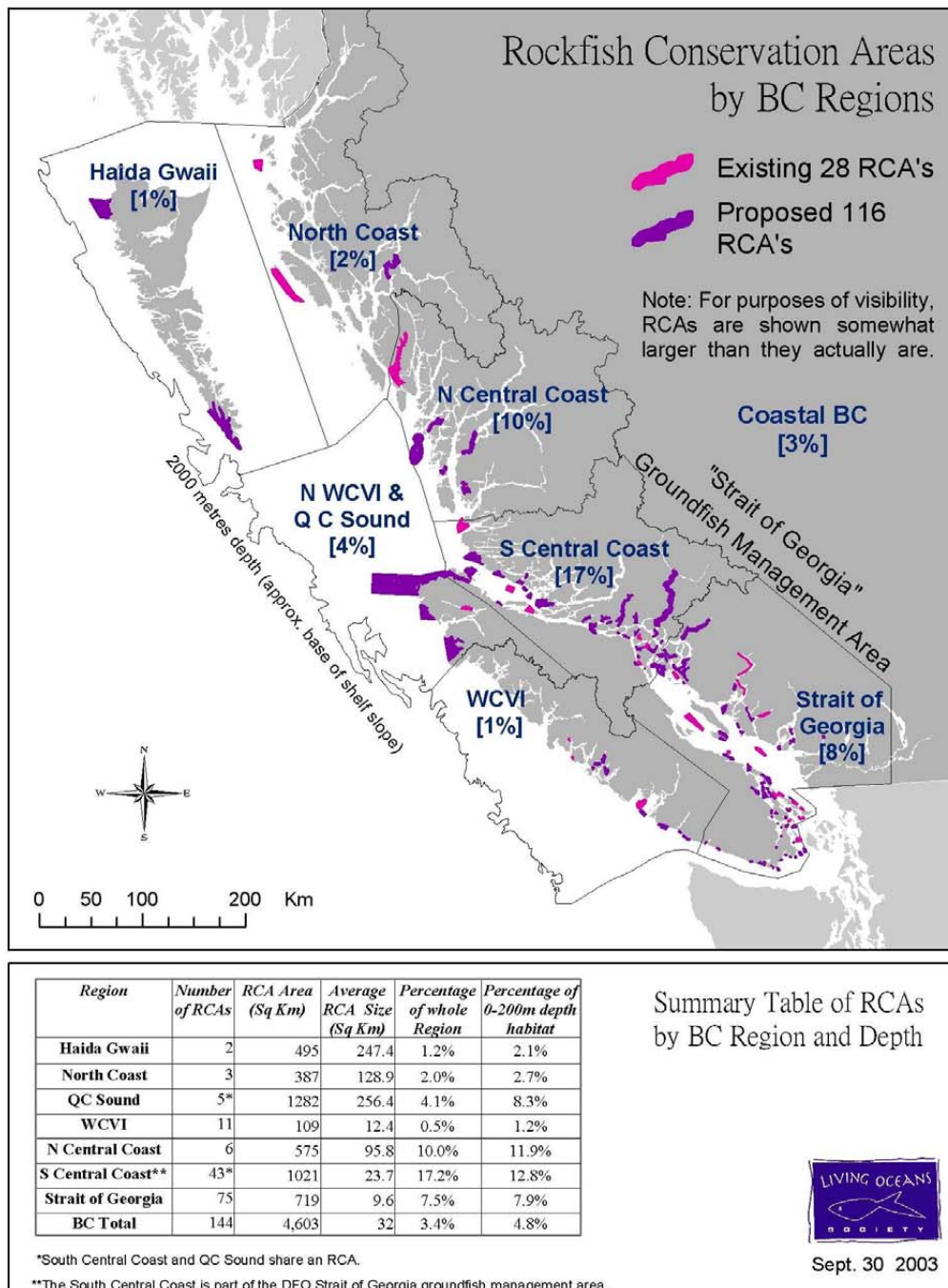


Figure 1: The distribution of Rockfish Conservation Areas (RCAs) varies considerably throughout the province. On this map we look at all 144 RCAs, existing and proposed. We evaluate them by region, first looking at overall percentages. However, percentages can be misleading. Many of these waters might not harbour suitable rockfish habitat. Because all species of inside rockfish can be expected to be found in the 0-200m depth range, we used this as a very rough indicator of possible rockfish habitat. (See Table) However, until better surveys or modeling are done, it is impossible to say how well the RCAs are protecting rockfish habitat.

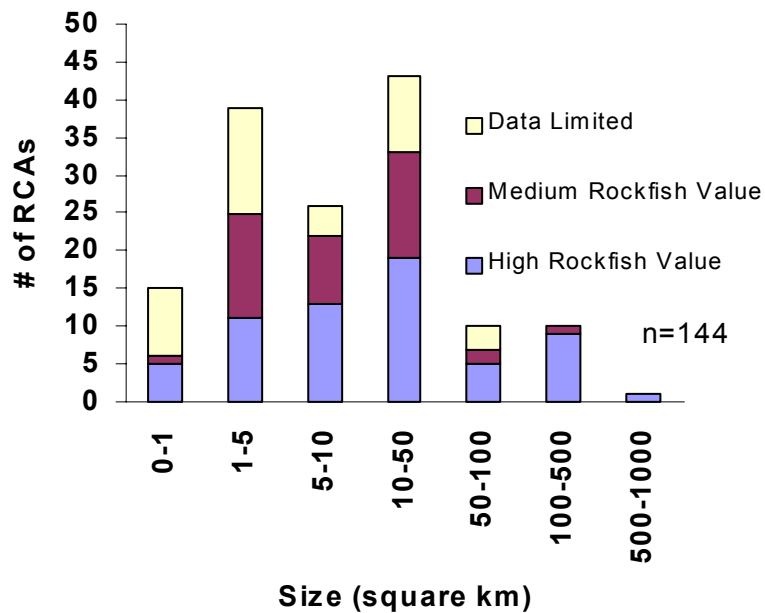


Figure 2: Size distribution of 144 proposed and interim rockfish conservation areas (RCAs) and proportion of sites with high, medium, and data limited rockfish values. Areas less than 1km² are generally considered too small to cover the known movement patterns of inshore rockfish.

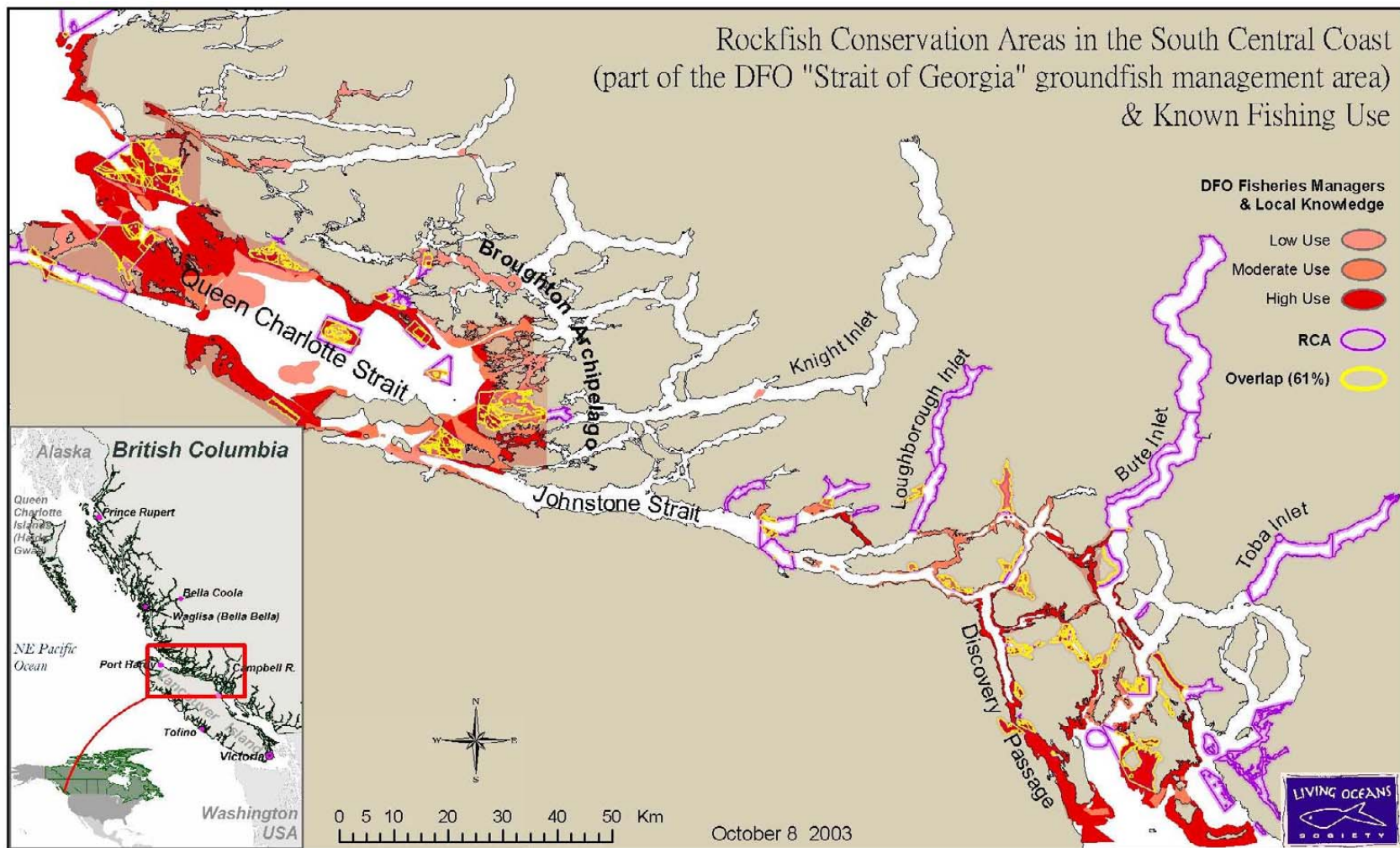


Figure 3: A comparison of existing and proposed Rockfish Conservation Areas (RCAs) with known rockfish fishing activities. Notice that while many areas in the passages overlap, local knowledge indicates that the inlets are not utilized, and potentially do not harbour rockfish. Of the 1274 sq km of RCAs shown on this map, 774 sq km (61%) overlap with known fishing areas. Thus, 39% of RCAs in the S Central Coast do not occur on known rockfish fishing grounds. Data: DFO Coastal Resource Inventory System (interviews with fisheries officers and managers) merged with Living Oceans Society Local Ecological Knowledge Project. Map by J. Ardron, Living Oceans Society.

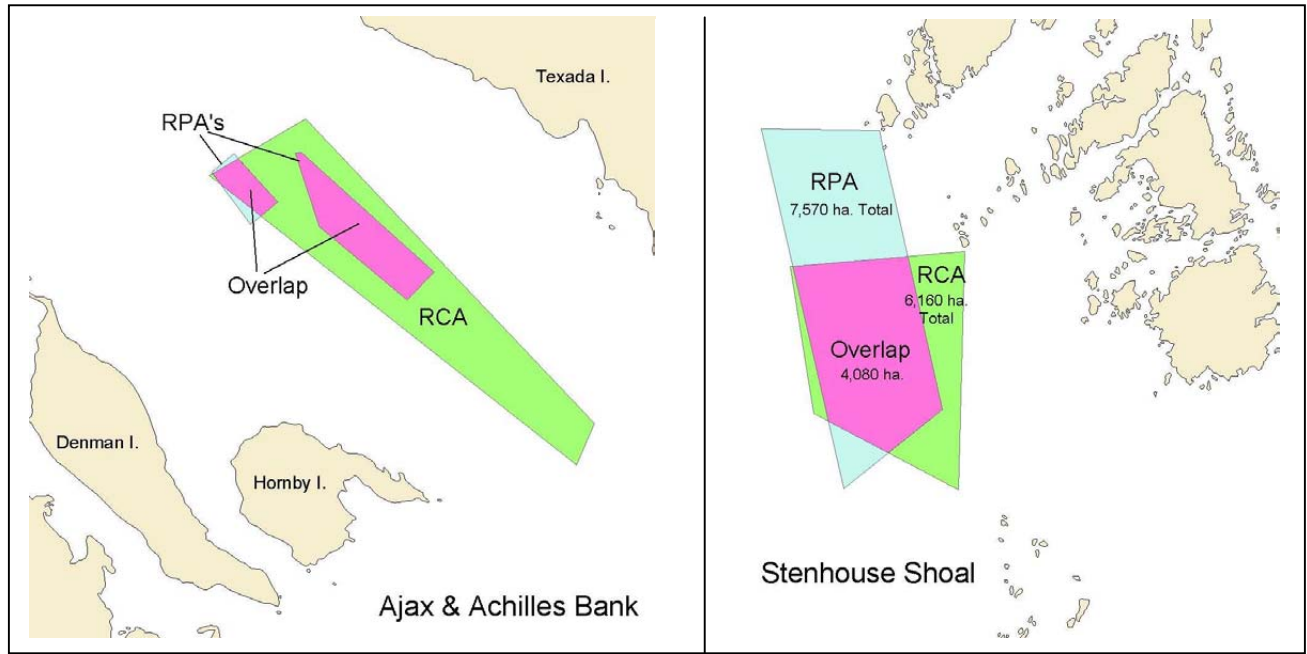


Figure 4: Examples of overlap between Rockfish Protection Areas and Rockfish Conservation Areas. At present time 11 of the 18 RPAs overlap with RCAs. Significant advances towards a successful RCA network could be achieved by combining these two processes.

14 Appendix 1: Permitted fishing within Rockfish Conservation Areas

Recreational:

- invertebrates by hand picking or dive,
- crab by trap
- smelt by gillnet

Commercial:

- invertebrates by hand picking or dive
- crab by trap
- scallops by scallop trawl
- euphausiid by mid-water trawl
- groundfish by mid-water trawl
- opal squid
- herring by gillnet, seine and spawn on kelp
- sardine by gillnet, seine, and trap
- smelt by gillnet

15 Appendix 2. Ministerial press release

INSHORE ROCKFISH CONSERVATION CONTINUES- June 3, 2003

Vancouver - Fisheries and Oceans Canada (DFO) today renewed its commitment to protect and conserve B.C.'s inshore rockfish stocks.

As announced in 2002, the Department's rockfish conservation strategy is designed to halt declines and allow inshore rockfish and lingcod stocks an opportunity to rebuild. This strategy is based on four specific conservation measures: reduce the total harvest of inshore rockfish and lingcod; establish areas for the protection of inshore rockfish where fishing will be restricted; improve catch monitoring; and establish a stock assessment framework for both species.

Harvesters have been actively engaged in each of the conservation measures. The direct harvest of inshore rockfish has been reduced overall, with a significant reduction in commercial fishing quotas in both the Inside ZN and the Outside ZN hook-and-line licences, as well a reduction in daily limits for the recreational fishery coast-wide. For the protection of inshore rockfish, a total of 28 Rockfish Conservation Areas (RCAs) have been established along the B.C. coast, where fishing is restricted for the commercial and recreational sectors.

Catch monitoring is in place for all commercial groundfish fisheries. A standard level of observer coverage for all commercial fisheries is being investigated for future implementation.

New fisheries-independent stock assessment methodologies are being developed in collaboration with U.S. agencies that have similar interests in visual assessment techniques. These new methods will be used in conjunction with B.C.'s traditional fishery-dependent catch indices and biological sampling programs to monitor population abundance.

Through consultation, DFO will be reviewing the 28 existing RCAs and evaluating the potential for implementation of over 100 new candidate RCA sites for the 2004 fishing season. Consultation will occur from June until late fall with First Nations, commercial and recreational harvesters, conservation groups and other interested parties. In the meantime, RCAs will continue to be in effect for the recreational and commercial sectors. The Department will also be engaged in discussions with First Nations to involve them in catch monitoring programs.

In 2003, improvements will be made within the commercial sector that will facilitate longer term sustainability of those fisheries. Initial discussion with all gear-types is leading to an integrated approach towards fisheries management. These improvements are intended to foster increased catch accountability and selectivity for all groundfish fisheries.

To comment on existing and proposed RCAs, and for more information on rockfish/lingcod sustainability and how you can help, please visit DFO's consultation website at www.pac.dfo-mpo.gc.ca. Maps of the current and proposed RCAs are available on this website for comment. You can also obtain a hard copy of the map package and a copy of a Rockfish Conservation Area brochure by calling Fisheries and Oceans Canada at 604-666-0384.