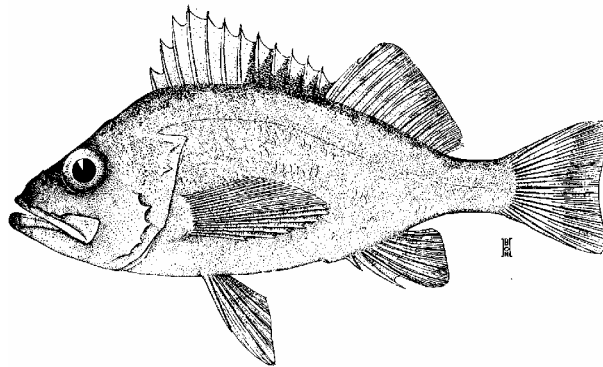


Seafood Assessment



Canary Rockfish *Sebastes pinniger*



(Image courtesy of)

Pacific Canada

November 8, 2005

Prepared by Scott Wallace
Blue Planet Research and Education

About SeaChoice® and Seafood Assessments

The SeaChoice® program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the Canadian marketplace. SeaChoice® defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. SeaChoice® makes its science-based recommendations available to the public in the form of a pocket guide, Canada's Seafood Guide, that can be downloaded from the Internet (www.seachoice.org) or obtained from the SeaChoice® program directly by emailing a request to us. The program's goals are to raise awareness of important ocean conservation issues and empower Canadian seafood consumers and businesses to make choices for healthy oceans.

Each sustainability recommendation on Canada's Seafood Guide is supported by a Seafood Assessment by SeaChoice or a Seafood Report by Monterey Bay Aquarium; both groups use the same assessment criteria. Each assessment synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic/sustainability criteria to arrive at a recommendation of "Best Choice", "Some Concerns" or "Avoid". The detailed evaluation methodology is available on our website at www.seachoice.org. In producing Seafood Assessments, SeaChoice® seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and scientific reviews of ecological sustainability. Information used to evaluate fisheries and aquaculture practices for assessments regularly comes from ecologists, fisheries and aquaculture scientists, members of industry and conservation organizations. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, SeaChoice's sustainability recommendations and the underlying Seafood Assessments will be updated to reflect these changes.

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SeaChoice® and Seafood Assessments are made possible through a grant from the David and Lucile Packard Foundation.

Executive Summary

Overall canary rockfish in British Columbia is given an avoid ranking due to three criteria being ranked as a ‘high’ conservation concern. At present time, canary rockfish in British Columbia are considered fully exploited with several fisheries independent surveys indicating an ongoing decline in abundance. Furthermore, U.S. surveys adjacent to Canada’s primary fishing ground for canary rockfish indicate a severe decline (95% depletion). The primary fishing method for capturing canary rockfish is by bottom trawl which automatically results in a red ranking for this criterion. In addition to strictly the gear type, the spatial extent of bottom trawling for canary rockfish is extensive and is often associated with catches of non-resilient benthic habitat structure such as coral and sponges. The management of this fishery is a also high concern. While the fishery is very well monitored with 100% observer coverage and adequate ongoing scientific monitoring, there has been little attempt to manage bycatch or alter fishing practices. Furthermore, management has not set the total allowable catch at the most precautionary level as recommended by stock assessment science.

Although canary rockfish are very long lived, they are ranked as having a moderate inherent vulnerability to fishing due to a moderate intrinsic growth rate. The nature of bycatch receives a moderate ranking. The ratio of kept to discarded biomass in the trawl fishery that captures canary rockfish is 5:1 which although seemingly high is moderate in relation to other fisheries in the world.

Table of Sustainability Ranks

Sustainability Criteria	Conservation Concern			
	Low	Moderate	High	Critical
Inherent Vulnerability		√		
Status of Stocks			√	
Nature of Bycatch		√		
Habitat Effects			√	
Management Effectiveness			√	

About the Overall Seafood Recommendation:

- A seafood product is ranked **Avoid** if two or more criteria are of High Conservation Concern (red) OR if one or more criteria are of Critical Conservation Concern (black) in the table above.
- A seafood product is ranked **Good Alternative** if the five criteria “average” to yellow (Moderate Conservation Concern) OR if the “Status of Stocks” and “Management Effectiveness” criteria are both of Moderate Conservation Concern.

- A seafood product is ranked **Best Choice** if three or more criteria are of Low Conservation Concern (green) and the remaining criteria are not of High or Critical Conservation Concern.

Overall Seafood Recommendation:

Best Choice 

Good Alternative 

Avoid 

Introduction

Canary rockfish are one of 37 species of rockfish presently known in Canada's Pacific waters. Like most rockfish species, canary rockfish have life history characteristics which make them vulnerable to fishing impacts. Characteristics include long life span, slow to reach full maturity, physoclastic swimbladders (which do not allow them to survive rapid changes in pressure as is the case when they are brought to the surface), and moderate rate of growth.

Canary rockfish have been exploited in Canadian waters by both domestic and international fleets since the early 1950s. During the 1950s and 1960s, canary rockfish populations in Canada's water were targeted primarily by American vessels. Beginning in 1977, following the declaration of Canada's Exclusive Economic Zone, Canadian trawlers slowly began replacing American trawlers. Since 1982 the canary rockfish fishery in Canada's waters has been exclusively a domestic fishery. Landings of canary rockfish peaked in 1988 at 1816 t. Since 1996 an average of about 840t/yr have been landed by all gear sectors of which 95% is landed in bottom trawl fisheries.

Fisheries management and associated yield recommendations have undergone several iterations since 1980. Total allowable catch has varied over the last 25 years depending on a combination of factors including estimated stock size, trends in catch per unit of effort, and biological indicators such as age and size structure of the population. Current coastwide annual total allowable catch is 1175 t of which 87.7% is allocated to trawl licenses and the remaining 12.3% to hook and line (H&L) licenses. The last stock assessment for canary rockfish was in 1999 (Stanley 1999). Canary rockfish are currently being assessed by COSEWIC. As part of this process a Canadian Science Advisory Secretariat (CSAS) document is being produced (Stanley et al. under review). This document was vetted through the National Advisory Process in early November 2005. The data included in the CSAS document will be the basis of a COSEWIC Status Report to be reviewed in May of 2007.

Canary rockfish are managed as two putative stocks: a west coast of Vancouver Island (Pacific Marine Fisheries Commission 3C+3D) and a Queen Charlotte Sound stock (PMFC Areas 5A+5B) (Figure 1). In addition to areas 3CD and 5AB, area-based TACs are given for management areas 5CD and 5E. Coastwide, about 72% of the TAC is met each year but varies considerably by management area. For example, in areas 3CD 96% of the TAC is caught representing about 60% of the total landings, while in area 5E only 6% of the TAC is fulfilled representing 1% of the total catch.

Beginning in 1996, the commercial bottom trawl fleet became managed through the imposition of 100% observer coverage. This level of observer coverage became necessary as the fleet transitioned into an Individual Vessel Quota (IVQ) system beginning in 1997. The commercial catch data (landings and discards) for trawl caught canary rockfish is considered to be highly reliable. Hook and line fisheries are not as well understood but landings are thought to equal the actual catch (i.e., landings and discards).

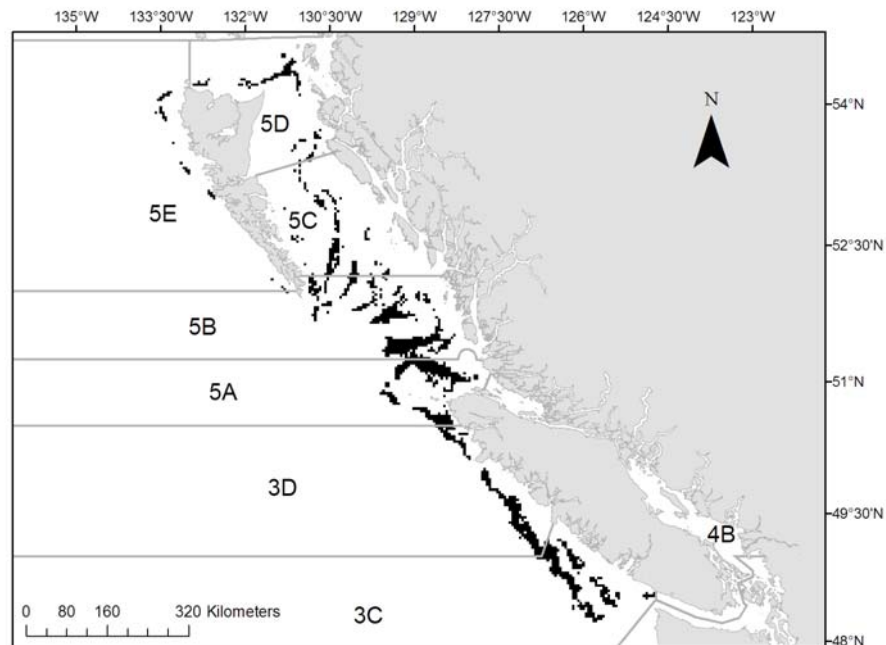


Figure 1. Distribution of canary rockfish commercial trawl catch in British Columbia (1996-2004). Also shown are the Pacific Marine Fisheries Commission (PMFC) management area designations. Figure from Stanley et al. (under review).

The canary rockfish stock along the west coast of Vancouver Island has some level of exchange with populations occurring off of Washington, Oregon, and California. U.S. stock assessments indicate that the population has declined to 5% of its historical biomass.

Scope of the analysis and the ensuing recommendation:

This analysis is limited to the recommendation surrounding canary rockfish in Canada's Pacific waters. Because sixty percent of Canada's landings are from a stock which straddles U.S. waters, U.S. assessments are also highly relevant in determining the final recommendation.

Availability of Science

Scientific information for carrying out this assessment is relatively complete. One area of concern is the degree of exchange between Canadian and US populations. Regardless of the exchange rate, both US and Canada's WCVI population indicate a declining long term trend. Life history information is collected regularly for canary rockfish.

Market Availability

Common and market names: Canary rockfish, rock cod, red snapper, rockfish

Seasonal availability: Year round

Product forms: Fillets

Import and export sources and statistics:

Import and export statistics are not available. Canary rockfish are exported as an aggregated category of several rockfish species.

Analysis of Seafood Watch® Sustainability Criteria for Wild-caught Species

Criterion 1: Inherent Vulnerability to Fishing Pressure

Canary rockfish are moderately vulnerable to fishing pressure. While there are varied reported ranges in the literature for the life history characteristics, the range of estimates typically fall within the ranges of the criteria identified through the assessment methodology. The intrinsic rate of increase for canary rockfish is not precisely known. Fishbase reports the doubling time for canary rockfish as 4.5-14 years which translates into an estimated r value between 0.05 and 0.15 (medium). The growth rate or Von Bertalanfy growth coefficient (K), is a measure of the rate at which the asymptotic length is approached. For canary rockfish, K has been estimated in Oregon and Washington between 0.162 and 0.189 for males and from 0.111 to 0.146 for females (Methot and Piner 2001) and in British Columbia K was estimated at 0.137 for males and 0.095 for females (Archibald et al. 1981). The maximum size of a canary rockfish in Canadian waters is 68 cm (Stanley et al., under review). Age at maturity varies by sex. Females tend to mature at a later age than males, with 50% maturity at 13 years and about 8 years respectively. The reproductive potential for canary rockfish, as measured by fecundity is high.

Table 1. Life history characteristics of canary rockfish.

Intrinsic Rate of Increase (r)	Age at Maturity	Growth Rate	Maximum Age	Fecundity	Species Range	Special Behaviors	Population Variability	Sources
Medium 0.05 and 0.15	F 1 st (8 yrs) F 50% (13 yrs) F 100% (20 yrs) M 50% (7-8 yrs) M 100% (15 yrs)	To 68cm, 5.7 kg. Various estimates in literature 0.095F 0.137 M	Males-84, Females 77	260,000-1,900,000	Western Gulf of Alaska to northern Baja California.	Physoclastic swim bladders	Possible to have several years of poor recruitment.	Archibald et al. (1981). Fishbase Love et al. 2002. Stanley 1999


F=Females, M=Males

Synthesis


Overall, the life history characteristics of canary rockfish suggest that they have a moderate inherent vulnerability to fishing pressure (yellow). When r is known it serves as the basis of the ranking.

Criterion 1: Inherent Vulnerability to Fishing Pressure	
Primary Factors to Evaluate	Ranking
Intrinsic rate of increase 'r'	Yellow
Age at first maturity	Yellow
Von Bertalanfy growth coefficient 'k'	Yellow
Maximum Age	Red
Reproductive potential (fecundity)	Green
Secondary Factors to Evaluate	
Species range	Yellow
Special behaviours or requirements	Yellow
Quality of habitat	Yellow
Overall Rank	Yellow

Inherent Vulnerability Rank:

Resilient 

Neutral 

Vulnerable 

Criterion 2: Status of Wild Stocks

For management purposes, British Columbia's canary rockfish population is broadly managed as two separate stocks: west coast Vancouver Island (WCVI-Areas 3CD) and Queen Charlotte Sound (QCS-Areas 5ABC). In 2004, 65% of the commercial landings were from the WCVI stock. Generally speaking there is better stock status information for the WCVI stock. The WCVI overlaps with the U.S. stock but to an unknown degree. One single tagging study has indicated that canary rockfish can move several hundred kilometers over relatively short time periods (DeMott 1983). It is highly probable that the WCVI stock has a high degree of exchange with the US stock in the context of their long generation times (23 years). For this reason, the report also reports US findings.

Factor 1: Management classification status

In Canada, canary rockfish are fully exploited (DFO 1999), in adjacent US waters to the south of Canada, Canary rockfish have been considered 'overfished' since 1999. This factor receives a yellow ranking.

Factor 2: Current population abundance relative to BMSY

Canadian assessments for canary rockfish rely primarily on survey indices and not MSY calculations. In US waters, the spawning stock biomass is ~11% of the spawning stock biomass at MSY or an estimated depletion level of 5.3% of its unfished biomass (Methot and Stewart 2005). Under the assumption that the Canadian portion of the stock has a high degree of interchange with the US stock, this category receives a red ranking.

Factor 3: Occurrence of Overfishing

Unknown.

Factor 4: Overall degree of uncertainty in status of stock

This stock is managed by both fisheries dependent and independent data. The fishery dependent data is not considered reliable for this species due to several factors which influence the CPUE. The fishery independent data is limited in both spatially and temporally but does certainly exist. Trends in canary rockfish abundance are monitored by the DFO WCVI shrimp survey, DFO Queen Charlotte Sound shrimp survey, US National Marine Fisheries Service Triennial Survey, and the DFO Hecate Strait Multi-species assemblage survey. This factor receives a yellow ranking.

Factor 5: Long-term trend

Two fisheries independent abundance indices along the WCVI indicate a long term decline in canary rockfish, but given that these data are currently under review the exact numbers are not presented in this document (Stanley et al. under review). Two surveys for the QCS stock indicate conflicting results. The QCS shrimp survey shows an increasing trend in abundance over

a short time period (1999-2005) whereas the Hecate Strait survey shows a long term moderate decline. Commercial catch per unit of effort (CPUE) is stable or increasing coastwide. CPUE data is considered less reliable than fishery independent survey data due to several factors which influence catch rates.

Factor 6: Short term trend

Short term trends are variable or largely unknown. Given this species life history, short term trends are inconclusive. This factor receives a yellow ranking.

Factor 7: Current age, size, or sex distribution








There is some evidence of decline in the mean length of males along the WCVI but not females. Both sexes in this region demonstrated a decline in the mean age between 1975 and 1990 but have been stable since this time. For the QCS stock there has been no observed change in size or age distribution. Overall, this factor is being considered as yellow as some areas seem normal while others are skewed.

Table 2. Stock status of canary rockfish.

Classification Status	B/B_{MSY}	Abundance Trends/CPUE Long term	Age/Size/Sex Distribution	Degree of Uncertainty in Stock Status	Sources
Canada: fully fished (Canada) Overfished (US Adjacent waters) Depletion level 5.3% (2.7-7.9%).	US: $SB_{2005} = 1,850$ t (95%; 996-2,704) $SB_{MSY} = 15754$ $B/B_{MSY} = .11$ or 11% There is only one estimate of a probable B_{MSY} in Canadian waters - 542 t. US ONLY	Generation time: 22.8 yrs Canada: WCVI triennial data (1980-2001): decline WCVI shrimp survey (1975-2005): decline QCS survey data (1999-2005): increasing. Hecate Strait survey: moderate decline. Commercial CPUE is stable or increasing (1996-2004). Coastwide (Walters and Bonfil): $B_{1996}/B_0 = 0.29-0.77$ with a mean proportion of 0.49.	WCVI: M: decrease in length. F: no decrease in length. M&F: decrease in mean age (1975-1990; 1990+no trend) QCS: no decrease in either length are age distributions observed.	Low for WCVI High for QCS	Method and Stewart (2005). Stanley et al. under review Walters and Bonfil (1999).

Synthesis

Overall, canary rockfish are given a ‘red’ or high conservation concern ranking for this criterion based on a fully exploited status, declining trends, and an unnatural age structure in the area where most of the catch is taken. The decision was based primarily on data from the WCVI stock. Trends in the QCS stock is largely unknown but there is some evidence of both a long term decline and a recent increase. The WCVI status is corroborated by similar trends from adjacent US waters. Given that most of the catch (65%) is from southern waters an overall BC ranking of red is warranted.

Criterion 2: Status of Wild Stocks	
Primary Factors to Evaluate	Ranking
Management classification status	
Current population abundance relative to BMSY	
Occurrence of overfishing	unknown
Overall degree of uncertainty in status of stock	
Long term trend in abundance	
Short term trend in abundance	
Current age, size, or sex distribution	
Overall Rank	

Status of Wild Stocks Rank:

Healthy 

Moderate/Rebuilding 

Poor 

Critical 

Criterion 3: Nature and Extent of Bycatch

Seafood Watch® defines sustainable wild-caught seafood as marine life captured using fishing techniques that successfully minimize the catch of unwanted and/or unmarketable species (i.e., bycatch). Bycatch is defined as species that are caught but subsequently discarded (injured or dead) for any reason. Bycatch does not include incidental catch (non-targeted catch) if it is utilized, accounted for and/or managed in some way.

This analysis is restricted to understanding bycatch of canary rockfish in the trawl fishery. While canary is caught by hook and line gear types most of the recorded catch (95%) is taken by trawl gear. Discarding rates in the hook and line fleets are not well known at present time but are likely in the moderate category (10-100%).

Factor 1: Quantity of Bycatch

To assess bycatch in the trawl fleet, only trawl tows containing at least one canary rockfish in the 2003 and 2004 fishing season were considered. Canary rockfish is caught in association with 256 identified species/aggregates including invertebrates, marine mammals, and other fish (Table 3). Thirty of the fish species are managed by TACs. A total of 28,631 t of biomass comprised of all species has been caught by trawl tows containing canary rockfish of which 23,762 t has been landed (i.e., sold) with the remaining 4,869 t discarded. The landed to discard ratio is 0.2 or in other words for every five pounds of marketable fish caught in the fishery one pound of non-marketable biomass is discarded. This factor results in a yellow ranking.

Note: Canary rockfish themselves have an extremely high retention rate (99.9%) as the fishery does not encounter non-marketable undersized individuals. It is also worth noting that 66% of the discards are from five species- arrowtooth flounder (32%), spiny dogfish (13%), Pacific hake (11%), spotted ratfish (6%) and rex sole (5%).

Table 3. Summary of bycatch and discarding statistics in British Columbia's trawl fishery capturing canary rockfish. The analysis is restricted to the fishing years of 2003 and 2004.

# of species/ categories	256
# of TAC species	30
Total catch (t)	28631
Total discard (t)	4869
Total TAC catch (t)	21457
Total non TAC (t)	7174
Canary catch (t)	1631
Canary discard rate (%)	0.1
Bocaccio catch (t)	235

Factor 2: Population Consequence of the Bycatch

Bocaccio, a type of rockfish, is presently the only pacific marine fish species listed by COSEWIC. In December of 2005, a decision will be made by the Minister of the Environment as to whether or not to list this species under the Species at Risk Act. Bocaccio are regularly caught in tows associated with canary rockfish. While the trawl fishery is not necessarily driving bocaccio to extinction, it is certainly a contributing factor limiting their recovery which results in a red ranking for this factor.

Factor 3: Trends in Bycatch Rates






This analysis only included data from the last two fishing seasons. The trend in bycatch is technically unknown, but it is likely stable and therefore receives a yellow ranking.

Secondary Factor: Ecosystem Impacts

There are no studies indicating ecosystem impacts in response to the discarding of biomass in this fishery. It is therefore unknown and receives a yellow ranking.

Synthesis

Because this fishery has very good data, the bycatch ratio of all biomass being captured in the fishery is well known and was found to be moderate. Although a species of concern is regularly and likely impeding recovery, the overall trend in bycatch is stable which results in an overall rank of yellow or moderate.


Criterion 3: Bycatch	
Primary Factors to Evaluate	Ranking
Quantity of bycatch	
Population consequence of bycatch	
Trends in bycatch rates	
Secondary Factors	
Ecosystem Impacts	
Overall Rank	

Nature of Bycatch Rank:

Low 

Moderate 

High 

Critical 

Criterion 4: Effect of Fishing Practices on Habitats and Ecosystems

Habitat Effects

Primary Habitat Factors

Factor 1: Impacts of Fishing Gear on Habitat.

Approximately 95% of canary rockfish are taken by the bottom trawl fishing method (Stanley et al. under review). This method is widely known to disrupt bottom habitat and is therefore is considered to cause *great damage* (red).

Factor 2: Resilience of the Habitat Trawled

The bottom habitat exposed to trawling on British Columbia's continental shelf is primarily deep water (>100m) sandy mud bottoms. There are several records of corals, sponges, and other benthic structure forming organisms caught by the trawl fleet suggesting that at least some of this habitat has a low resilience to the impacts of bottom trawling (see bycatch section). It is worth noting that these areas have been trawled for two to six decades and therefore many of the non-resilient species would have largely disappeared prior to the beginning of the observer program in 1996. Since the introduction of individual vessel quotas (IVQs) in 1997, the annual area trawled has decreased as fishing effort has tended to have contracted to core areas. Evidence of decline is based on the number of fished blocks plotted on a 10X10 km grid. In 1996 there were 672 blocks with at least one trawl tow in 2004 this had been reduced by ~25% to 515 (DFO unpublished data). The spatial contraction of the trawl fleet has both positive and negative interpretations as it applies to this criterion. A contraction, due to consolidation of the fleet and less overall effort, translates into *possibly* less area trawled on an annual basis (a precise analysis of this has yet to be done on this coast) which is a net conservation benefit. On the other hand, the concentration of the fleet into core areas will likely yield less bycaught non-resilient species as identified through the observer program due to years of trawling. A case can be made that ongoing bottom trawling is preventing the restoration of habitat that prior to trawling would have supported larger concentrations of non-resilient species than observed today. Overall the resilience is *low* (red).

Factor 3: Spatial Extent of the Impact.

Ninety five percent of the commercial trawl catch for canary rockfish is taken between the depths of 73-271 m which translates into a maximum habitat area of 60,043 km². Of this area, there are records of trawl tows containing canary rockfish in 32,788 km² based on 5X5 km grid squares. The gear impacts for the pursuit of canary rockfish are *large scale* (red). Also see factor #2 for discussion on area trawled.

Primary Ecosystem Factors

Factor 1: Disruption of food webs.

There are no demonstrated ecosystem impacts from the removal of canary rockfish and are therefore unknown (yellow).

Factor 2: Changes in ecosystem state.

The ecosystem impacts from this fishing method, as defined by the guidelines, have not been demonstrated (yellow).

Synthesis

This criterion is given a severe ranking (red) based on the impacts of fishing gear alone. Both the spatial extent of the impact and the resilience of the habitat trawled are also red but are not necessary to meet the criterion’s severe ranking.

Criterion 4: Effect of Fishing Practices on Habitats and Ecosystems	
Factors to Evaluate	Ranking
Impacts of Fishing Gear on Habitat	■
Resilience of the Habitat Trawled	■
Spatial Extent of the Impact	■
Disruption of food webs	■
Changes in ecosystem state	■
Overall Rank	■

Effect of Fishing Practices Rank: Benign ■ **Moderate** ■ **Severe** ■ **Critical** ■

Criterion 5: Effectiveness of the Management Regime

Factor 1: Stock Assessments

Canary rockfish were last assessed by Stanley (1999) which is now outdated. Overall the assessment is thorough and robust. This factor receives a yellow ranking.

Factor 2: Scientific Monitoring

Scientific monitoring of canary rockfish involves both fisheries independent and fisheries dependent data. Fisheries independent data is confined to biological sampling (aging, lengths, etc.) and multispecies trawl surveys. Overall this factor receives a green ranking.

Factor 3: Scientific Advice

Stanley (1999) recommended yield options by management area. For areas 3CD, 700 t was recommended as a maximum yield (Table 4). In view of expected poor year classes through the 1990s, declining populations in US waters, uncertainty in the model assumptions and an alternative assessment by Walters and Bonfil (1999), Stanley (1999) suggested a minimal harvest of no more than 50% of the average yield (350 t). Immediately following this assessment in 2000, a quota of 499 t was implemented for area 3CD (of which 479 t was caught by all gear types). For the 2001-2006 fishing seasons, the quota in area 3CD was increased to 529 t for no transparent reason. Science advice was not strongly followed. The TAC for areas 3CD and 5AB are 50% greater than *suggested*. Because management did not follow the most precautionary recommendations explicitly described by stock assessment scientists the Scientific Advice factor receives a red ranking.

Table 4. Summary of maximum recommended yield, suggested yield, actual TACs, average catch, and % of TAC caught by management area.

Area (gear type)	Maximum Recommended Yield (t)	Suggested Yield (t)	Actual TAC (t)*	Actual Catch (t) (Average 2001-2004)	% of TAC caught
3CD (trawl)	700	350	529	508	96
5AB (trawl)	350	175	265	221	84
5CD (trawl)	50-150		101	71	70
5E (trawl)	100-200		151	9	6
Coastwide (H&L)			129	38	30
Total			1175	843	72

*Note that the TAC has been the same since the 2001/02 fishing season.

Factor 4: Bycatch

There is no plan in place to effectively reduce the amount of bycatch in the commercial bottom trawl fishery and therefore this factor receives a red ranking.

Factor 5: Fishing Practices

Bottom trawling is the primary gear type targeting canary rockfish. The Department of Fisheries and Oceans has made very little attempt to mitigate the ecosystem impacts of bottom trawling. At present there are four trawl closures in waters of the Eastern Queen Charlotte Sound and Hecate Strait for the protection of sponge reefs (DFO 2005). Overall, the effectiveness of these measures have not been demonstrated nor have measures been taken to address several other conservation concerns associated with bottom trawling. Given the relatively small area that is protected from trawling for conservation reasons, these measures are deemed ineffective and are given a red ranking.

Factor 6: Catch Monitoring and Enforcement









The Option A trawl fishery is responsible for catching ~95% of the canary rockfish catch. This fishery is subject to 100% onboard observer coverage as well as 100% dockside monitoring. The regulations of this fishery are very well enforced. This category receives a green ranking.

Factor 7: Management Track Record

Has the long term abundance and ecosystem integrity associated with the canary rockfish fishery been maintained through management? Fisheries independent indices for area 3CD indicate that the stock is below long term abundance and is in decline. On the other hand, this stock has been fished for nearly 50 years and available catch data collected since 1967 suggests that the stock's productivity has been maintained. Overall, the management track record is unknown and given a yellow ranking.

Table 5. Commercial harvest management measures for the canary rockfish fishery.

Management Jurisdictions & Agencies	Total Allowable Catch	Size Limit	Gear Restrictions	Trip Limit	Area Closures	Sources
DFO	2005/06 1046 t coastwide	No size limits. Marketable size is 30+ cm.	Trawl (87.7% of TAC), Hook and Line (12.3% of TAC)	Not applicable to TAC species	Sponge reefs.	DFO 2005

Criterion 5: Effectiveness of the Management Regime	
Factors to Evaluate	Ranking
Scientific Monitoring	
Stock Status	
Scientific Advice	
Bycatch	
Fishing Practices	
Catch Monitoring and Enforcement	
Management Track Record	
Overall	

Synthesis

This criterion is given an overall ranking of ineffective or red. While the stock has been apparently maintained for several decades based on recorded catches, recent trends indicate that the abundance is low relative to historical levels. Management has not adjusted the TAC accordingly and has actually increased the TAC well above that recommended as precautionary by DFO scientists.

Effectiveness of Management Rank:

Highly Effective 
 Moderately Effective 
Ineffective 
 Critical 

Overall Evaluation and Seafood Recommendation


Table of Sustainability Ranks

Sustainability Criteria	Conservation Concern			
	Low	Moderate	High	Critical
Inherent Vulnerability		√		
Status of Stocks			√	
Nature of Bycatch		√		
Habitat Effects			√	
Management Effectiveness			√	

Overall Seafood Recommendation:

Best Choice 

Good Alternative 

Avoid 
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Supplemental Information

Acknowledgements

Scientific review does not constitute an endorsement of the Seafood Watch® program, or its seafood recommendations, on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

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