Seafood Assessment

SeaChoice
healthy choices, healthy oceans

Longnose Skate and Big Skate
Raja rhina and *Raja binoculata*

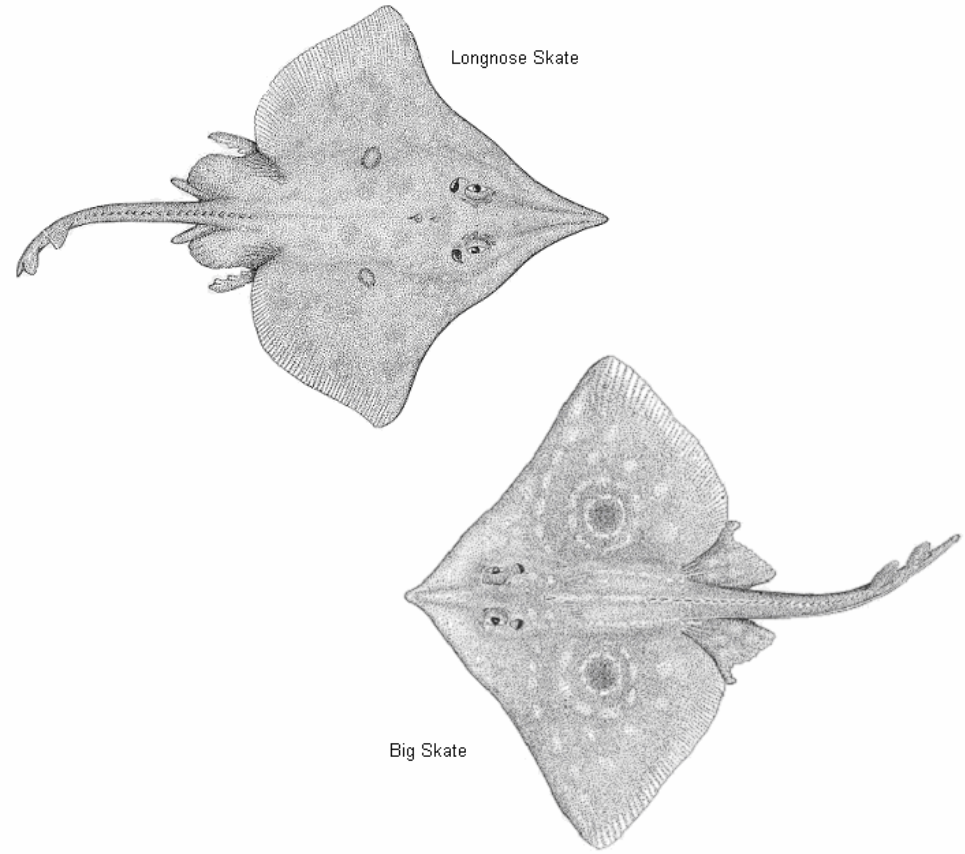

Image courtesy of Hart (1973)

British Columbia
April 2006

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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.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Assessments in any way they find useful, with acknowledgement. For more information about SeaChoice® and Seafood Assessments, please contact the SeaChoice® program via e-mail and telephone information available at www.seachoice.org

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

Executive Summary

Big and longnose skate captured in British Columbia waters are given an overall seafood recommendation of avoid. Combined, these species account for 99.7% percent of the skate landings in British Columbia. Big and longnose skate are slow growing and have a moderate age of first maturity. Big and longnose skate have never received a proper stock assessment and therefore the status of the stocks is largely unknown. Unpublished indices of abundance combined with maintained catches suggest there is no immediate conservation concern. Approximately 82% of the skate landings are captured by bottom trawl and the remaining 18% is captured by longlines. The discard (bycatch) rate of non-targeted species by both gear types is typically over 20%. There are no legally protected endangered species regularly captured by these fleets. Most of the skate landed are captured by bottom trawling, a gear type considered to cause great damage to habitat. Capture of skates by longlining is generally thought to cause less damage to habitats. Skates are not actively managed in British Columbia. Aside from a single-area TAC for the trawl fleet and a monthly vessel catch limit for the longline fleet there are no restrictions. Management has made no effort to reduce the amount of bycatch or habitat damage. Skates have never received a proper stock assessment which is the main shortcoming of this fishery pulling it towards a recommendation of 'avoid'.

Table of Sustainability Ranks

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

Overall Seafood Recommendation:

Best Choice Good Alternative Avoid

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

In Canada's Pacific waters there are records of eleven species of skate (Gillespie pers. comm. 2006), six of which are recorded in commercial catch records but two species, big and longnose skate, account for 99.7% of the landings (Table 1). These two species are the largest and most abundant of the skate species encountered in Canadian waters. Both the longnose skate and big skate are found from the eastern Bering Sea, along the Aleutian Islands through to Point Conception, California. The longnose skate can also be found further south through to Baja California and into the Gulf of California (Mecklenburg et al. 2002). They share several similar life history traits such as slow growth rates and low fecundity but have different habitat preferences (Ebert 2003, McFarlane and King in press). Longnose skate are typically found on mud-cobble bottoms often near boulders, rock ledges, and other areas with vertical relief whereas big skate are found in shallower waters on sandy-muddy bottoms (Ebert 2003). Although both species can often be found side-by-side, typically they are spatially separated and therefore interact with fisheries in different ways. Big skate are predominantly caught by bottom trawls with lesser amounts caught by bottom longlines. Longnose skate on the other hand are caught equally by both gear types.

Table 1. Landings (t) of skate species from Canada's Pacific waters between 1996 and 2004 in both longline and trawl fisheries. Source: DFO PacHarvTrawl and PacHarvHL databases.

Species Name	Landings (t)	% of Total
Big skate	8553	83.6
Longnose skate	1644	16.1
Sandpaper skate	25	0.2
Abyssal skate	2	0.0
Alaska skate	2	0.0
Roughtail skate	1	0.0
Total	**10227**	**100**

Fishery

Skates have been recorded in British Columbia's catch statistics since 1954 as a single category comprising all species. It was not until 1996 that big and longnose skate were identified to the species level in the commercial catch statistics. Big skate are primarily caught as bycatch while in pursuit of other groundfish but during certain times of year in certain locales they are purposefully sought after. Longnose skate are primarily caught as bycatch in the trawl fleet and halibut longline fishery. Prior to 2002 most skate captured as bycatch by longlines were discarded. Improved market conditions beginning in 2002 resulted in a sudden increase in the amount retained (Figure 1). Both species are caught throughout British Columbia's waters (Figure 2). Northern Hecate Strait (Area 5D) is particularly important for both species and waters off the southwest coast of Vancouver Island are important of longnose skate (Figure 2).

Skates are loosely managed. The trawl fishery has total allowable catch (TAC) limits set in Areas 5C/D of 567t/yr and 47t/yr for big and longnose skate respectively but no TAC or catch

limit elsewhere on the coast. The longline fleet is limited to monthly vessel limits of 5.7 t of total skate landings with no area restrictions.

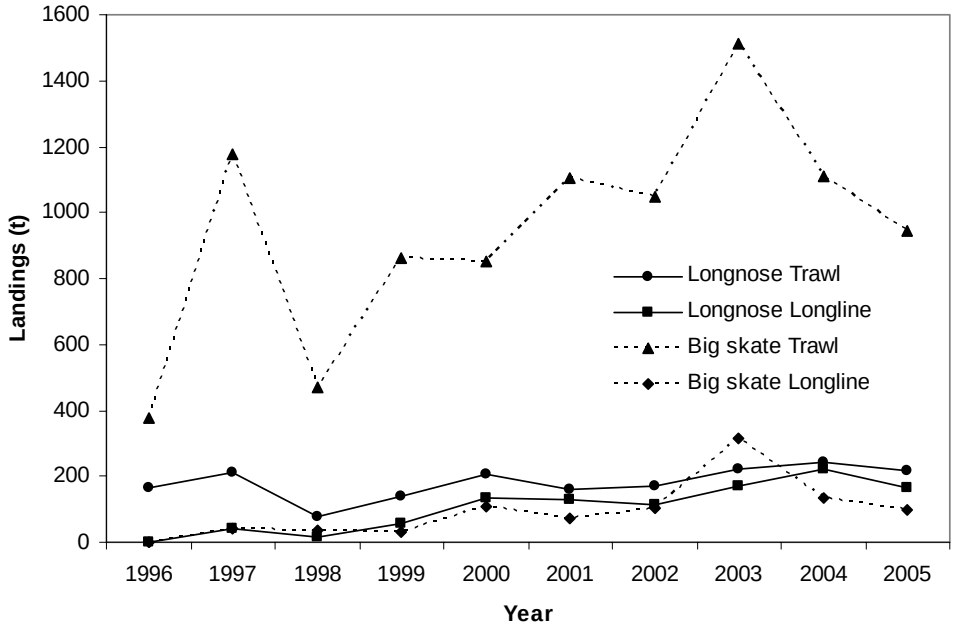

Figure 1. Landings (t) of big and longnose skate in Canada's Pacific waters by fishing gear type from 1996 to 2004. Source: DFO PacHarvTrawl and PacHarvHL databases.

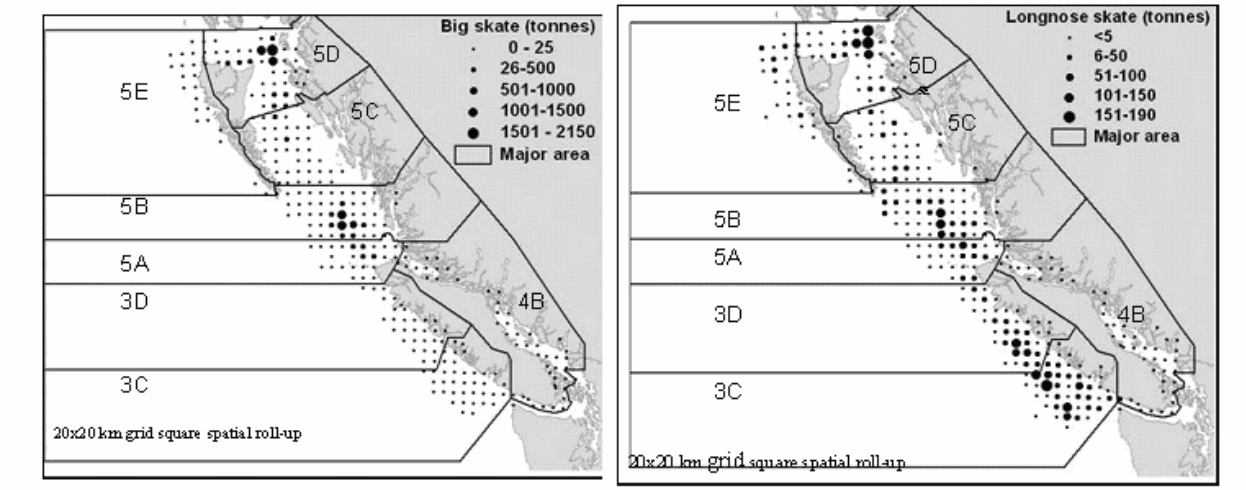

Figure 2. Relative catch distribution of big (left) and longnose (right) skate in commercial trawl (total catch) and hook and line (retained catch only) fisheries between 1996 and 2005 shown in 20X20km grid squares. Source: PacHarv databases.

Scope of the analysis and the ensuing recommendation:

The recommendation from this analysis is limited to big and longnose skate captured in Canadian waters.

Availability of Science

Skates have not received a proper stock assessment in Canadian waters. A review of their catch history and biology in British Columbia was prepared by Benson et al. (2001). The findings of Benson et al. (2001) clearly highlighted the need for further information regarding the basic biology, life history and movement patterns. Since that time a four-year tagging study on big skate has been undertaken (2003-2006) as well as some estimates of growth, age, and maturity have been ascertained (McFarlane and King in press).

Market Availability

Common and market names: Big and longnose skate are marketed under the name 'skate'.

Seasonal availability: Both species of skate are captured year round with peaks in availability in June and July.

Product forms: In British Columbia all companies that process skate sell them as fresh or frozen wings.[1] Alleged selling of skate as fake scallops in the form of punched out discs made from the wings does not appear to be occurring in Canada.

Import and export sources and statistics: Import and export statistics on skate species is not presently recorded.[2] Most of the landings of big and longnose skate are exported to South Korea (Burridge, pers. comm. 2006).

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

Criterion 1: Inherent Vulnerability to Fishing Pressure

Skates in general are considered to be inherently vulnerable to fishing pressure. Big and longnose skates are "equilibrium strategists" which means they should have steady population dynamics over time (King and McFarlane 2003). This term also implies they have a low intrinsic rate of increase due to low fecundity, late maturation and slow growth. Skates in other regions of the world have shown vulnerability to overexploitation through either directed fisheries or as inadvertent bycatch (Brander 1981; Walker and Hislop 1998; Casey and Myers 1998; Frisk et al. 2001; Frisk et al. 2002).

The growth rate or von Bertalanfy growth coefficient (*K*) is a measure of the rate at which the asymptotic length is approached and it is often used as an indicator of a species resilience to fishing pressure. The growth rate (*K*) of big and longnose skate in Canadian waters is ~0.04 and 0.07 respectively (McFarlane and King, in press). McFarlane and King (in press) estimate big skate age of 50% maturity as 6 yrs for males and 8 yrs for females and longnose skate age of 50% maturity at 7 yrs for males and 10 yrs females. Fecundity is largely unknown but considered to be low for both species. Skates deposit egg capsules which for big skate typically contain four embryos and only one for longnose skate (Ebert 2003). The interval between egg laying events is unknown. Both skate species are very susceptible to bottom trawl gear due to sedentary behaviour. There is no indication that there habitat has been impacted by any non-fishery related activities.

Table 2. Life history characteristics of longnose and big skate.

Species	Growth Rate	Age at 50% Maturity	Maximum Age	Fecundity	Species Range
Big skate	K=0.04	Male=6 years Female=8 yrs	26 years	Egg capsule contain 1-8 embryos, typically 4.	North Pacific
Longnose skate	K=0.07	Male=8 years Female=10 yrs	26 years	Egg capsule contains 1 embryo.	North Pacific

Synthesis

Criterion 1: Inherent Vulnerability to Fishing Pressure	
Primary Factors to Evaluate	**Ranking**
Intrinsic rate of increase 'r'	Not found
Age at first maturity	
von Bertalanfy growth coefficient 'k'	
Maximum Age	
Reproductive potential (fecundity)	
Secondary Factors to Evaluate	
Species range	
Special behaviours or requirements	
Quality of habitat (non-fishery impacts)	
Overall Inherent Vulnerability to Fishing Pressure Rank	

Criterion 2: Status of Wild Stocks

Factor 1: Management classification status

Skate are not actively managed in British Columbia. Indicators of stock status such as range contraction and change in average size are not well known. Benson et al. (2001) provide the only published information on the possible status of skate species in Canada's Pacific waters. They report that big and longnose skate are thought to be inherently vulnerable to fishing. The fact that these two species still comprise most of the catch and that limited biological data indicates no functional change in the size structure may be an indication that the stocks are healthy. Additionally the catch distributions shown in Figure 2 suggest that the population is still well-distributed.

There is only one long term data set available for big skate and that is from the Hecate Strait groundfish survey (Area 5CD) (Olsen 2005, unpublished data; Figure 3). These data indicate a relatively stable population from 1984-2003 with an increasing encounter rate over the time series (Figure 4). There is considerable error associated with these estimates due to variations in big skate abundance and/or survey variability. Longnose skate is also indexed by the same survey but the variability (i.e., CV>20%) is considered too large to be a reliable indicator of abundance (Sinclair et al. 2003). It should be noted that both big and longnose skate are presently being evaluated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Overall this factor is given a yellow ranking as the status of big and longnose skate is largely unknown.

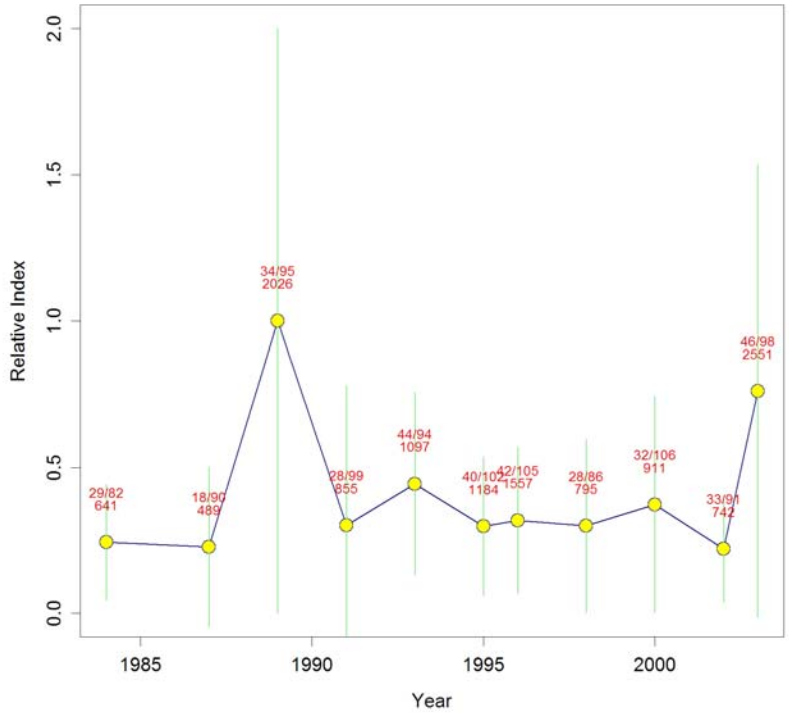

Figure 3. Relative indices for big skate from the Hecate Strait multi-species assemblage survey. The symmetric 95% confidence limits are shown as vertical lines. The numbers above each point indicate the number of sets in which big skate were caught and the total number of sets in

the survey (top numbers), and the total catch weight (kg) of big skate (bottom number). Source: Olsen (2005) unpublished data, GFBio database.

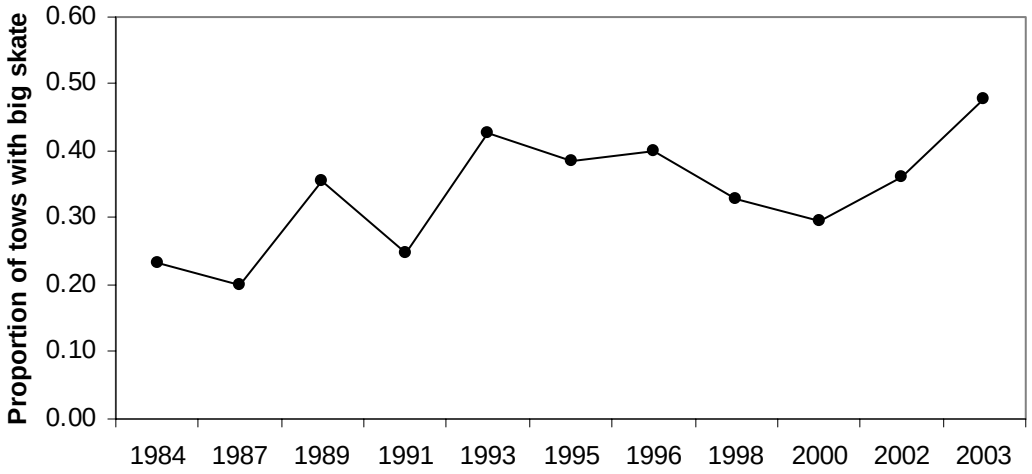

Figure 4. Proportion of tows containing big skate from the Hecate Strait trawl survey (1984-2003). Data source: GFBio database

Factor 2: Abundance threshold

There have been no attempts to derive an abundance threshold or target reference point for this species. This factor receives an unknown yellow ranking.

Factor 3: Occurrence of Overfishing

There has been no attempt to establish overfishing thresholds for these species. This factor receives an unknown yellow ranking.

Factor 4: Overall degree of uncertainty in status of stock

Although there has been no published stock assessment on this species, unpublished fisheries independent research data and fisheries dependent catch data are collected on an ongoing basis. Since 2003, several multispecies groundfish surveys have been implemented (i.e., Queen Charlotte Sound bottom trawl survey, West Coast Vancouver Island bottom trawl survey). Early data (unpublished) from these surveys indicate that they may be suitable in tracking the long term abundance of these skate species. Overall there is a moderate degree of uncertainty surrounding big and longnose skate populations and therefore this factor is given a yellow ranking.

Factor 5: Long-term trend

The long term trend indicates that the abundance of this species is stable over time (see Factor 1 above. This factor receives a yellow ranking.

Factor 6: Short term trend

The short term trend is not well understood for either species. The last available survey point for the Hecate Strait groundfish survey was in 2003. In 2005 this survey was completely redesigned and therefore the pre-2005 data is not comparable to the redesigned 2005 data (Workman pers. comm. 2006). Unpublished data from a newly implemented groundfish survey in Queen Charlotte Sound (Areas 5B/C) has shown an increase in abundance over three survey years (2003-2005) (DFO GFBio database unpublished data).

Factor 7: Current age, size, or sex distribution

The natural age, size and sex structure of big and longnose skate populations are unknown. Published information from British Columbia waters is limited to Benson et al. (2001) but there is insufficient data to show temporal changes. Unpublished biological data indicates that approximately 63% of big skate males and 27% of females captured in the Hecate Strait research survey are at lengths above the value representing 50% maturity (DFO GFBio database, unpublished data). Overall this factor receives a yellow ranking due the unknown nature of these biological parameters.

Synthesis

Criterion 2: Status of Wild Stocks	
Primary Factors to Evaluate	**Ranking**
Management classification status	
Current population abundance relative to BMSY	
Occurrence of overfishing	
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 Status of Wild Stocks Rank	

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.

In 2005 approximately 82% of the combined big and longnose skate landings were captured by bottom trawls, the remaining 18% were captured by longline technologies (Figure 5). Both gear types are non-selective. Since 1996 the trawl fleet has been subject to 100% at-sea observer coverage which has recorded the utilization of all species. The hook and line fleet has had a less comprehensive observer program amounting to about 10-15%.

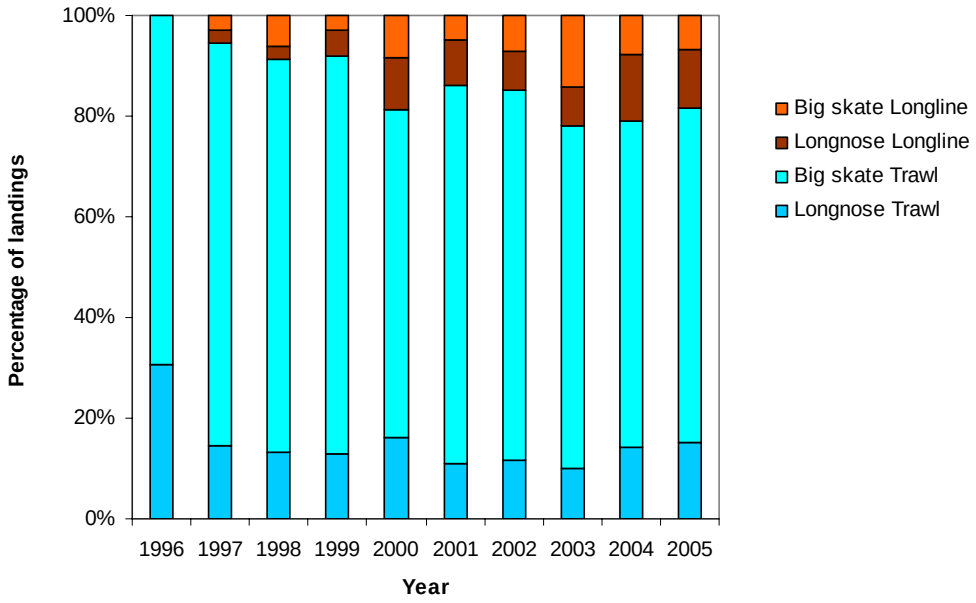

Figure 5. Percentage of big and longnose skate landings by year and gear type from 1996 to 2005. Source: PacHarv databases.

Factor 1: Quantity of Bycatch

Bottom Trawl

From 1996 to 2004 the bottom trawl fishery in British Columbia caught ~350,000 t of fish and other marine life (DFO PacHarvTrawl database, unpublished data). Of this amount, approximately 80 000 t was discarded for a total landings to bycatch ratio of 23%. There are several hundred species of animals caught in this fishery. The status of most of these species is at best poorly known. There is only one species that is currently listed as threatened by COSEWIC and that is the rockfish species *bocaccio* listed in 2002. Several other marine fish species caught by this fishery that are presently going through the COSEWIC assessment process. Bocaccio is not legally listed through the Species at Risk Act and therefore there are no legal consequences

associated with harming or capturing them. The trawl fleet has voluntarily agreed to not sell bocaccio which has effectively removed any incentive to capture them and has resulted in a reduction in their catch (FOC 2004).

Longline

Between 2001 and present approximately 10-15% of all longline trips occurring in British Columbia waters carried an onboard observer. Longline trips targeting halibut, dogfish, lingcod, and rockfish all capture big and longnose skates as bycatch. From 2001 to 2004 a total of 9239 t of various species of fish were caught during observed trips. Of this amount, 2308 t were discarded for a total discard rate by weight of 25%. The discarded biomass is comprised of sub-legal sized halibut (38%), spiny dogfish (18%), sablefish (13%), longnose skate (9%), arrowtooth flounder (5%), big skate (4%) and lingcod (4%). The remaining 10% is comprised of a variety of other species (DFO PacHarvHL database, unpublished data).

Overall, this factor is given a yellow ranking based on the discard to landings ratio of 23% by trawl and 25% by longline gear.

Factor 2: Population Consequence of the Bycatch

Trawl

As mentioned previously there are hundreds of species captured in this fishery whose status is unknown. At present time there are no known species whose populations are being driven towards extinction due to this fishery. This factor is given a yellow ranking.

Longline

Of particular concern is the bycatch of black-footed albatross, a species listed as endangered by the IUCN (Birdlife International 2004). As a condition of license, all longline vessels operating in British Columbia require a seabird avoidance device which consists of either, single or paired streamers and a towed buoy. The annual bycatch of black-footed albatross is likely in the order of ~10 animals based on expansions from at-sea observer data. This amount is small relative to the estimated 8000 black-footed albatrosses caught annually by American, Japanese and Taiwanese fleets operating in the North Pacific (BirdLife International 2005). Also captured by longlines are several other elasmobranch species such as blue, sleeper, bluntnose sixgill and soupfin sharks and several skate species whose populations are poorly understood. Overall this category is given a moderate ranking.

Factor 3: Trends in Bycatch Rates

The bycatch rate in British Columbia's bottom trawl fishery has varied but has not shown a dramatic increase or decrease from 1996 to 2004 (DFO PacHarvTrawl database, Figure 6). The cause for the decline in discard rate in 2001 is unknown. There is no reason to believe that bycatch in the longline fleet has changed. However, it should be noted that a major reform to the longline fishery is expected to come into effect in 2006. This reform will include 100% observer

coverage on all longlining vessels in the form of electronic monitoring. The increase in observer coverage is part of a larger objective of integrating all gear sectors and allowing transferability of quota between license types. It is expected that these reforms will result in a decrease in discard rates. Overall this factor receives a yellow ranking.

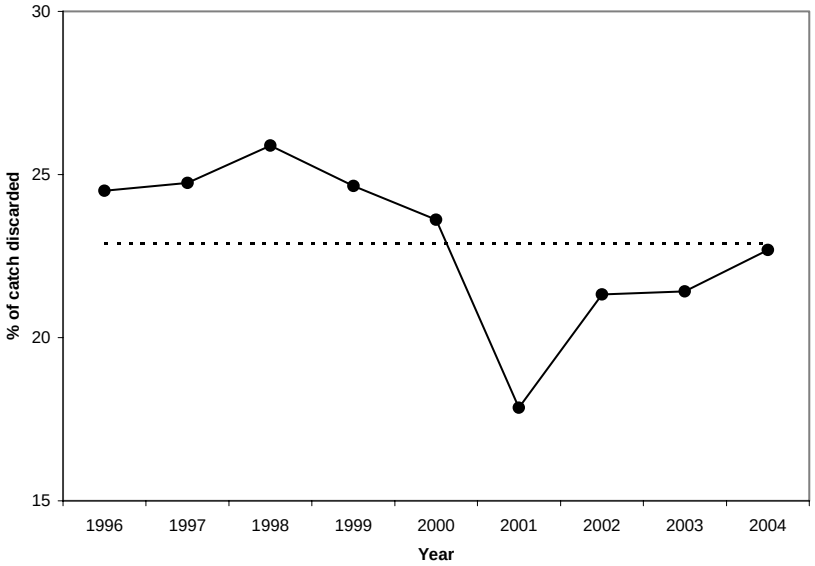

Figure 6. Percentage of total catch by weight discarded in British Columbia's commercial bottom trawl fishery. Dotted line represents the series average. Source: PacHarvTrawl database.

Secondary Factor: Ecosystem Impacts

There is little doubt that the capture, discard and relocation of ~9000 t/year of biomass in the trawl fishery alone from the marine ecosystems surrounding British Columbia will to some degree alter the normal ecological pathways. However, due to the complexity of the marine ecosystem combined with the lack of ecosystem-based studies there is presently no evidence to indicate any changes in the ecosystem structure due to discarding. This factor receives an unknown yellow ranking.

Synthesis

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

Criterion 4: Effect of Fishing Practices on Habitats and Ecosystems

Factor 1: Impacts of Fishing Gear on Habitat.

Approximately 82% of skates are taken by bottom trawls (see Figure 5). This method is widely known to disrupt bottom habitat and is therefore considered to cause *great damage* (red). The remaining 18% is taken by longline gear which is considered to cause moderate damage (yellow).

Factor 2: Resilience of the Habitat

Trawl

The bottom habitat exposed to trawling on British Columbia's continental shelf is primarily deep water (>50m) on a variety of substrates (Figures 7 & 8) (Sinclair et al. 2005). Each substrate provides the basis for a different ecological community each with an inherently different resilience to bottom trawling. However the resilience of these communities to bottom trawling has not yet been defined in British Columbia. Big skate are mostly associated with *Holocene sand and gravel* in waters between 20-100 m and longnose skate are found equally on *Holocene sand and gravel* as well as *Holocene mud* in deeper waters (Sinclair et al. 2005; PacHarvTrawl unpublished data). The resilience to disturbance from bottom trawling for each of these habitat types is unknown. Figure 2 clearly indicates that both of these species are caught throughout British Columbia waters. For precautionary purposes this factor is evaluated at the scale of the entire bottom trawl fishery until which time the proportion of big and longnose skate landings by habitat type are known.

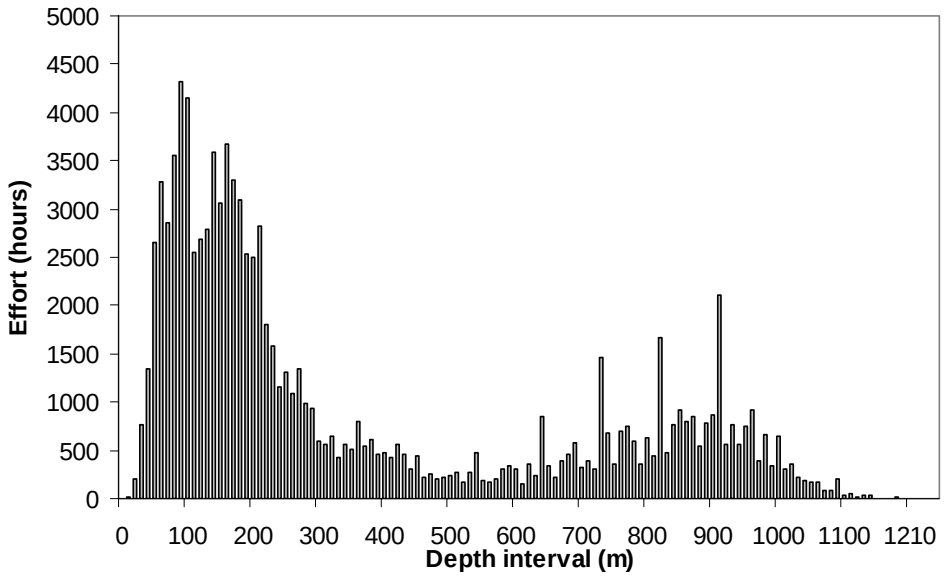

Figure 7. Trawl effort by depth in British Columbia's commercial bottom trawl fishery from 1996 to 2004. Source: DFO PacHarvTrawl database.

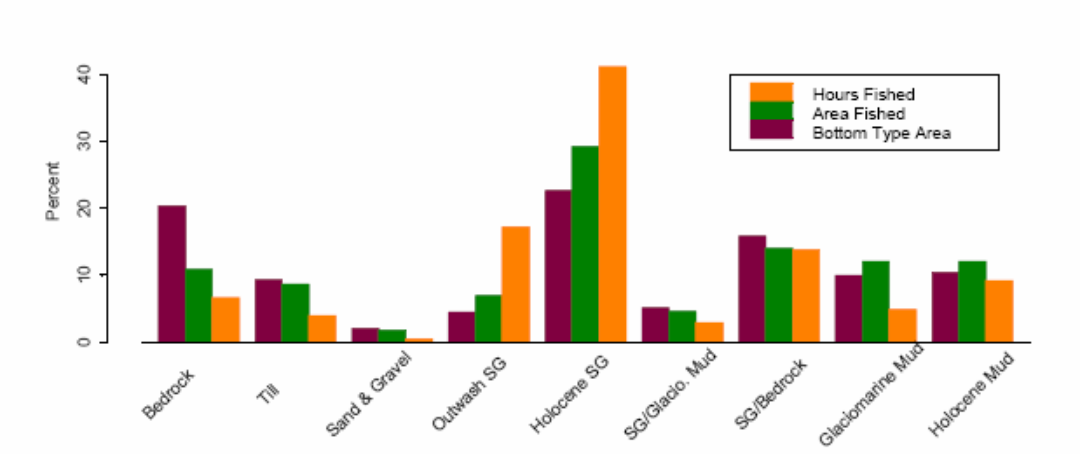

Figure 8. Spatial extent of surficial units and the bottom trawl fishery over these units in Hecate Strait and Queen Charlotte Sound. The fishery distribution of the fishery is described by the area fished and by the distribution of fishing effort (hours). The upper panel shows the percent distribution of surficial units (bottom type), area fished, and hours fished. Source: Sinclair et al. 2005.

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. 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 (FOC 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 non-resilient species 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 considered to be low and therefore this factor receives a red ranking for trawl caught skates.

Longline

Longline gear can be set on all forms of habitat from mud to bedrock. The distribution of longline effort by habitat type is unknown and therefore this factor receives a yellow ranking for longline gear.

Factor 3: Spatial Extent of the Impact.

Commercial fisheries for big and longnose skate is very widespread occurring over 68 000 km^2 and 80 000 km^2 respectively based on 10X10 km grid squares (Figure 8). The gear impacts occur over large spatial scale and therefore this factor receives a red ranking.

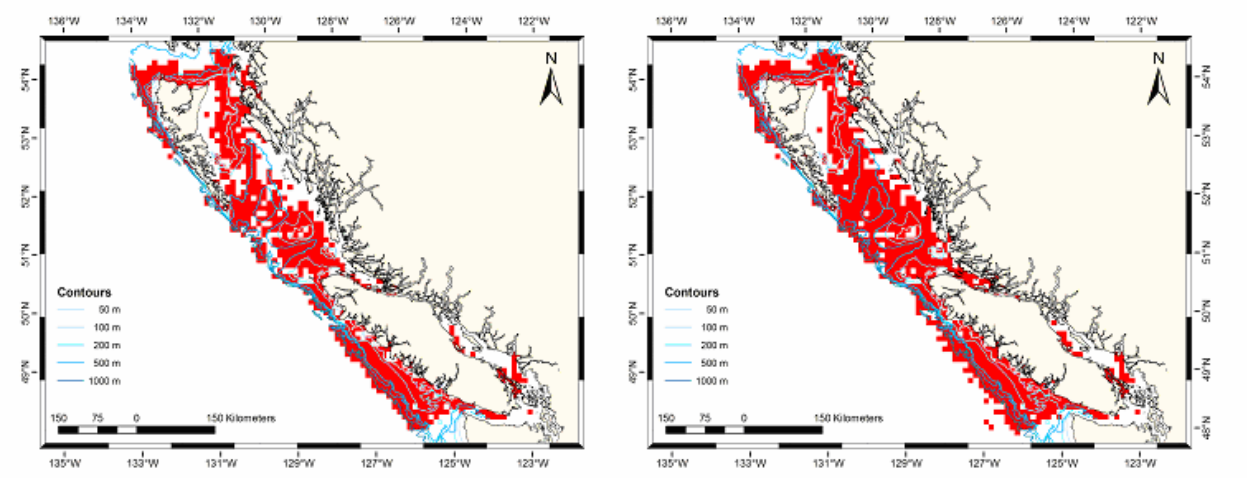

Figure 8. Distribution of big skate (left) and longnose skate (right) on a 10 x 10 km grid based on catches in the commercial trawl and longline fisheries (1996-2004). Source: Olsen 2005, PacHarvTrawl database.

Primary Ecosystem Factors

Factor 1: Disruption of food webs.

There are no demonstrated ecosystem impacts from the removal of either big or longnose skate. Overall the ecosystem impacts from their removal are unknown and therefore this factor receives a yellow ranking.

Factor 2: Changes in ecosystem state.

There is little doubt that the capture of ~40 000 t of biomass per year by bottom trawling and an unaccounted amount by longlining has wide ranging ecosystem impacts. The alteration of bottom habitat and trophic changes from the biomass removal itself will impact the ecosystem structure. Understanding these impacts in Canadian waters has not yet been properly investigated and therefore it is unknown whether large scale ecosystem state changes have occurred from trawling. This factor receives an *unknown* yellow ranking.

Synthesis

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

Criterion 5: Effectiveness of the Management Regime

Factor 1: Stock Assessments

Big and longnose skate have never been properly assessed and there is no plan to assess them in the near future. There is presently a trawl TAC for big and longnose skate in management areas 5C/D. The TAC for both species was based on the median catch level from area 5D from the years 1996 to 2000 (Benson et al. 2001). The TAC for big and longnose skate are respectively 567 and 47 t for areas 5C/D. This factor receives a red ranking until which time a proper assessment is undertaken.

Factor 2: Scientific Monitoring

The management process regularly collects fisheries independent and fisheries dependent data. Fisheries independent data is collected from annual or biennial bottom trawl surveys. Bottom trawl surveys have expanded in coverage over the last few years such that the main fishing areas for skate are now surveyed (Sinclair et al. 2003). Fisheries dependent data includes comprehensive and reliable observer data from the trawl fleet (i.e., CPUE, spatial distribution of the fleet, depth, etc.) and fisher logbook information from the longline fishery. Relative to most fisheries in the world there is considerable data obtained from British Columbia's groundfish fishery. The main problem is that these data, although collected for skate species are not regularly analyzed and therefore the populations are not truly monitored. If skate populations were to substantially increase or decrease in abundance this change would be first noticed by commercial fishers who would then voice their observation to DFO scientists. To data, there has not been an analysis of skate data in the context of developing a defensible stock assessment or for determining the status of the populations. This factor is given a yellow ranking until which time the data are used.

Factor 3: Scientific Advice

Publicly available scientific advice pertaining to skates has only been given once from DFO scientists to managers (Benson et al. 2001). The advice was for the implementation of a TAC in management area 5D of 700 t for big skate and 200 t for longnose skate. Actual TAC adopted by managers was 567 t and 47 t for big and longnose skate respectively for areas 5C/D. The TAC first took effect in the 2002/03 fishing season and applied only to the trawl fishery. In 2003 the hook and line skate landings increased threefold from 2002. In response fisheries managers imposed a monthly vessel limit of 5.7 t of all skate species which took effect in the 2004/05 fishing season. It is unknown how this trip limit was ascertained. Overall, management does consistently take scientific advice and the structure is in place to do so. The main limitation is that scientific advice on skates has not been requested. This factor receives a green ranking.

Factor 4: Management Plans to Control 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: Management Plans to Control Habitat Impacts from Fishing Practices

Bottom trawls are the primary gear type targeting big and longnose skate. Fisheries and Oceans Canada has made very little attempt to mitigate the ecosystem impacts of bottom trawling. At present there are four trawl closures in waters of eastern Queen Charlotte Sound and Hecate Strait for the protection of sponge reefs (FOC 2005). Overall, the effectiveness of these measures has 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 ~82% of the combined big and longnose skate catch. This fishery is subject to 100% onboard observer coverage as well as 100% dockside monitoring. The longline fishery which accounts for the remaining 18% has been subject to ~10-15% observer coverage over the last four years. All landings by the longline fleet are recorded by dockside monitoring. The regulations of this fishery are well enforced. This category receives a green ranking.

Factor 7: Management Track Record

Management has no track record for big and longnose skate populations. These species are loosely managed based on average catch. As long as fishers keep catching their quota of these species then the assumption will be that the population must be able to support this level of catch. In 2003 management acted in a timely way to impose a monthly catch limit on longline catch. Although stock productivity appears to have been maintained over a long period of commercial exploitation, it is not apparent that it is due to proper management. Landings of skate have generally increased over the last decade (see Figure 1). Skates are long lived animals and therefore the suitability of the current management needs to be evaluated over a longer period before its effectiveness can be judged. This factor is given a yellow ranking

Table 3. Commercial harvest management measures for big and longnose skate fisheries.

Gear type	Management Jurisdictions & Agencies	Management Measures
Trawl	DFO	TAC only in area 5C/D Big skate=567 t Longnose skate=47 t Elsewhere: no limit
Longline	DFO	No TAC Monthly vessel trip limit of 5.7 t. No area restrictions

Synthesis

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

Overall Evaluation and Seafood Recommendation

Big and longnose skate captured in British Columbia waters are given an overall seafood recommendation of avoid. Combined, these species account for 99.7% percent of the skate landings in British Columbia. Big and longnose skate are slow growing and have a moderate age of first maturity. The status of the stocks is largely unknown. Unpublished indices of abundance combined with maintained catches suggest there is no immediate conservation concern. Approximately 82% of the skate landings are captured by bottom trawl and the remaining 18% is captured by longlines. The discard (bycatch) rate of non-targeted species by both gear types is typically over 20%. There are no legally protected endangered species regularly captured by these fleets. Most of the skate landed are captured by bottom trawling--a gear type considered to cause great damage to habitat. Capture of skates by longlining is generally thought to cause less damage to habitats. Skates are not actively managed in British Columbia. Aside from a single-area TAC for the trawl fleet and a monthly vessel catch limit for the longline fleet there are no restrictions. Management has made no effort to reduce the amount of bycatch or habitat damage. Skates have never received a proper stock assessment which is the main shortcoming of this fishery pulling it towards a recommendation of 'avoid'.

Table of Sustainability Ranks

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

Overall Seafood Recommendation:

Best Choice Good Alternative Avoid

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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