Seafood Assessment

SeaChoice
healthy choices, healthy oceans

Arrowtooth Flounder

Atheresthes stomias

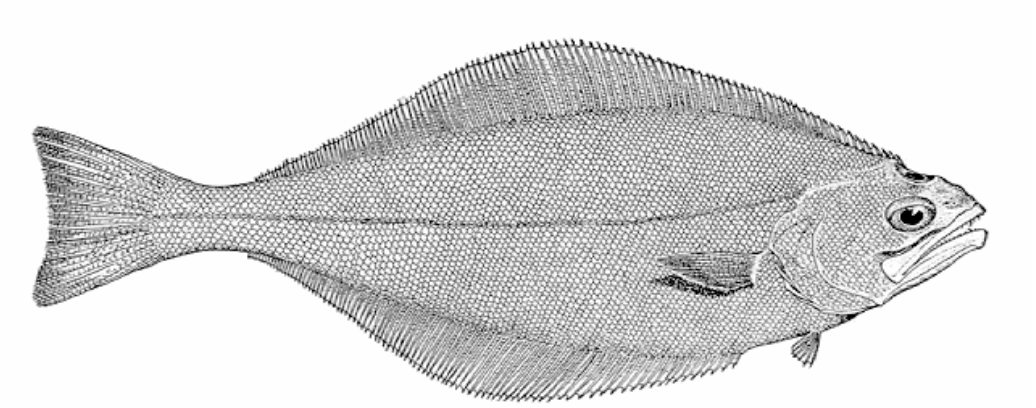

Image courtesy of Evermann and Goldsborough 1907

British Columbia

April 2006

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. 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

Arrowtooth flounder are an abundant widespread flatfish occurring throughout Canada's Pacific waters. They are caught almost exclusively by bottom trawls. Prior to 2005 this species was caught primarily as bycatch but was not normally targeted. Increased prices and developing markets in 2005 resulted in a tripling of the landings. They have a low inherent vulnerability to fishing pressure due to a fast growth rate, high fecundity, and a low age of first maturity. The status of the stocks appears to be in stable shape based on catch data and one long term biomass index. There are hundreds of species caught in association with arrowtooth flounder of which about 23% by weight are discarded. There are presently no legally-protected threatened species captured in this fishery. Capturing of arrowtooth flounder by use of bottom trawls causes a large scale disruption of bottom habitat. Management has not appropriately dealt with the surge of interest in this species. Overall this species receives a seafood ranking of high conservation concern. This ranking may be improved upon in the future with the implementation of suitable management measures.

Table of Sustainability Ranks

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

Introduction

Biology

Arrowtooth flounder are one of several species of flatfish found in North Pacific waters. They are distributed from as far north as the Bering Sea, along the Aleutian Islands continuing southward as far as central California. They occupy a wide variety of habitats and depths occurring between 12 and 900 m but typically at depths less than 300 m (Mecklenburg et al. 2002).

This species spawns several times within a season at depths greater than 350 m (Rickey 1995). Spawning typically occurs in the fall and winter after a seasonal bathymetric migration from shallow to deep waters. Their eggs are pelagic and drift with the currents. They are planktonic for ~145 days before settling on the substrate. Young of the year are typically found in shallow waters. Females grow larger than males. The maximum size female reported from British Columbia waters is 840 mm whereas the largest male is 750 mm (Fargo and Starr 2001). Males reach 50% maturity by age 4 and females by age 5 (Fargo and Starr 2001). Arrowtooth flounder have been aged to 25 years, although individuals older than 15 are rare in fished areas. The population structure of arrowtooth flounder is unknown.

Fishery

Arrowtooth flounder are an important component of the groundfish trawl fishery comprising ~8% of all the biomass caught by trawl vessels (GFBio Catch database, unpublished data). Until recently this species was not the focus of a directed fishery and was mostly caught as bycatch while in the pursuit for other species. The flesh of this species is naturally of poor quality compared to other species in the marketplace. Upon landing the flesh is further compromised by the release of an enzyme carried by a parasite that causes the flesh to become mushy. Recently, several food grade additives have been successfully used that inhibit enzymatic breakdown.

Prior to 2005 there was little interest in this species from either a fishery or management perspective. There have been few stock assessments and no effort to establish a total allowable catch (TAC). In 2005, the fishery witnessed a three-fold increase in landings and a doubling of catch compared to previous years. Halfway through the 2005 fishing season the Department of Fisheries and Oceans (DFO) instigated a midseason cap of 20 000 t (~2.5 times the average catch pre-2005) to control the catch. At the time of this assessment there was still no TAC in place for the 2006 season.

Scope of the analysis and the ensuing recommendation:

The recommendation from this analysis is limited to arrowtooth flounder captured in Canada's Pacific waters.

Availability of Science

Arrowtooth flounder has not received much scientific attention. There has been only one recent assessment (Fargo and Starr 2001). Another assessment undertaken by DFO was carried out in

January of 2006 but due to shortcomings of the research paper it was not accepted by the internal peer review process. At this point there is very little information regarding stock status and trends.

Market Availability

Common and market names: Arrowtooth flounder is more commonly known in the fishing industry as turbot but are typically marketed as arrowtooth flounder. It is one of at least 20 species of flatfish encountered in Canada's Pacific waters. Because of the large number of species, the marketplace does not always distinguish between them and therefore arrowtooth flounder may also be sold as sole or flounder.

Seasonal availability: Arrowtooth flounder is captured all year by the trawl fleet but is more abundant during the summer months when they are in shallower waters.

Product forms: Arrowtooth flounder is invariably sold frozen due to the poor lasting qualities of the flesh. The are sold in the round, j-cut, and as skinless fillets.

Import and export sources and statistics: Import and export statistics on arrowtooth flounder were not found. They are likely included in the export category of "flounder" or Pacific flatfish.[1] Much of the product is exported to United States as well as China (Turris, pers. comm. 2006).

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

Criterion 1: Inherent Vulnerability to Fishing Pressure

Arrowtooth flounder have pronounced sexual dimorphism resulting in different growth rates depending on the sex. 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. Males grow to a smaller size and therefore the rate in which they reach this size is faster. Males have a *K* of ~0.278 and in females K was found to be 0.192 both are considered to be high (Fargo and Starr 2001). Fecundity is reported for arrowtooth flounder from the Gulf of Alaska (Zimmerman 1997). Total fecundity increased exponentially with length ranging from 250,000 to 2,340,000 oocytes. Male arrowtooth flounder reach 50% maturity by age 4 and females by age 5 (Fargo and Starr 2001). Longevity is reported at a maximum of 23 years (Munk 2001). This species is distributed throughout the North Pacific.

Table 1. Life history characteristics of arrowtooth flounder.

Growth Rate	Age at 50% Maturity	Maximum Age	Fecundity	Species Range
K_m=0.278 K_f=0.192	M=4 years F=5 years	23 years	0.25-2.34 million	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	None
Quality of habitat (non-fishery impacts)	None
Overall Inherent Vulnerability to Fishing Pressure Rank	

Criterion 2: Status of Wild Stocks

For management purposes British Columbia's arrowtooth flounder population is broadly managed as a single population.

Factor 1: Management classification status

The only recent stock assessment for arrowtooth flounder concluded that current harvest was at a sustainable rate and was possibly underutilized based on biological indicators (Fargo and Starr 2001). In 2005 the catch increased significantly but it is unknown whether this level of harvest is sustainable (Figure 1). The stock size is unknown in British Columbia and therefore for the purposes of this report this factor is given an *unknown* yellow ranking.

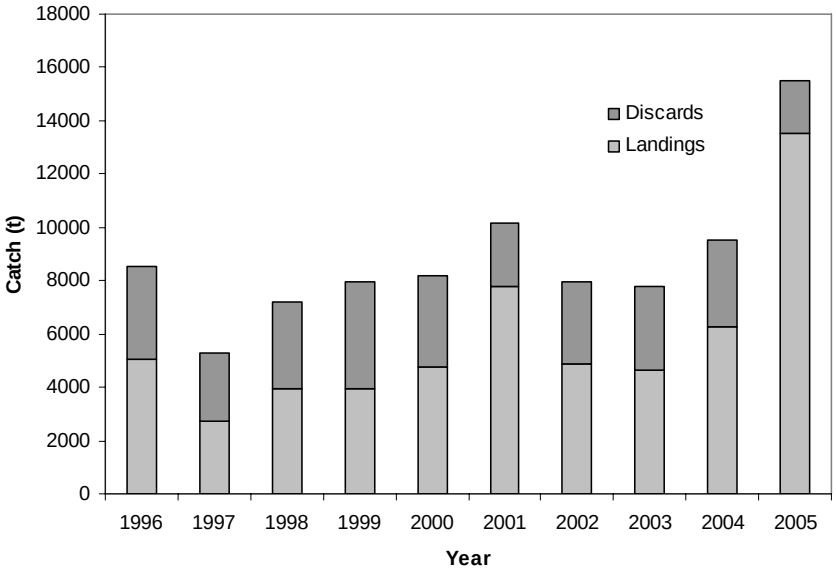

Figure 1. Landed and discarded catch of arrowtooth flounder from all gear sectors in Canada's Pacific waters shown by fishing year (April 1-March 31). Note that 2005 data is from only April 1, 2005 to September 30, 2005 (half a year). Source: DFO PacHarvTrawl/GFCatch databases.

Factor 2: Abundance threshold

The last stock assessment on arrowtooth flounder examined several indices to examine how fishing effort may have been impacting the population (Fargo and Starr 2001). The biomass survey index showed no adverse decline in abundance and biological indicators also did not detect any obvious signs of depletion. Based on these findings it is likely that the pre-2005 rate was sustainable. It is unknown whether the catches observed in 2005 (see Figure 1) are sustainable for the long term. This factor receives an *unknown* yellow ranking.

Factor 3: Occurrence of Overfishing

The 2001 stock assessment showed no signs of overfishing (Fargo and Starr 2001). The increase in catch observed in 2005 has not likely resulted in surpassing an overfishing threshold based on crude biomass estimates of the stock (DFO unpublished research survey data). This factor is given a green ranking.

Factor 4: Overall degree of uncertainty in status of stock

The stock size is largely unknown. A variety of recent groundfish surveys exist in Canada's Pacific waters that indicate that the population biomass is at least 50 000 t (DFO unpublished data). Fargo and Starr (2001) found that the biomass in Hecate Strait (northern BC) has fluctuated between 24 000 and 72 000 t over the surveys between 1984 and 2000. Biomass surveys along the southwest coast of Vancouver Island ranged from 16 000 to 77 000 t over the period from 1989 to 1998. Combined these areas represent only a portion of overall arrowtooth flounder habitat in Canadian waters. Furthermore, the biomass estimates are based on the assumption that all fish in the path of the trawl survey net are captured which underestimates the actual number of fish. While the precise biomass is not known, there is enough certainty from the biomass indices to give bounds on the minimum biomass. In recent years DFO has expanded the coverage of trawl surveys which in the future will further reduce the uncertainty. Overall this species is captured in several fisheries independent trawl surveys and therefore overall this factor is given a green ranking.

Factor 5: Long-term trend

The long term trend is known only from the Hecate Strait trawl survey which shows a long term variable but stable trend (Figure 2; Olsen 2005). This factor is given a yellow ranking.

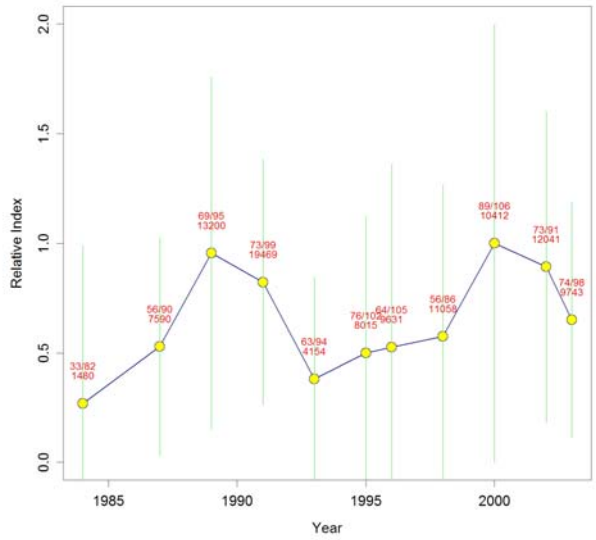

Figure 2. Relative indices for arrowtooth flounder from the Hecate Strait multi-species assemblage survey. The symmetric 95% confidence limits are shown as vertical lines. The numbers above each point indicate the number of sets in which arrowtooth flounder were caught

and the total number of sets in the survey (top numbers), and the total catch weight (kg) of arrowtooth flounder (bottom number). Source: Olsen (2005).

Factor 6: Short term trend

In the short term the trend based on the Hecate Strait multi-species survey is downwards. Given the natural variability in the abundance of this species this factor is given a yellow ranking.

Factor 7: Current age, size, or sex distribution

Fargo and Starr (2001) report no observed changes in age or size distribution. This factor is given a green ranking.

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.

Arrowtooth flounder is primarily caught by bottom trawl which is a non-selective gear type. Pre-2005, arrowtooth flounder was caught primarily as non-directed bycatch as part of a multi-species groundfish fishery. Beginning in 2005, due to an increase in value of this species, some vessels began directly targeting arrowtooth flounder. For the purposes of this report, bycatch associated with arrowtooth flounder is considered in the context of the entire bottom trawl fishery.

Factor 1: Quantity of Bycatch

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 (~9000 t/yr) 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 poorly understood. There is one species that is currently listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and that is the rockfish species *bocaccio* listed in 2002. Several other marine fish species caught by this fishery are presently going through the COSEWIC assessment process (e.g., big skate, spiny dogfish). 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 small reduction in their catch (DFO 2004).

The discard rate of arrowtooth flounder has generally decreased over the last ten years due to improved market conditions resulting in an incentive to retain this species (Figure 3). During the period from 1996-2004 arrowtooth flounder accounted for 35% of all the discarded bycatch in the bottom trawl fishery. A decrease in the discard rate for this species will also result in a fishery-wide decrease in the landings to bycatch ratio. Overall, this factor is given a yellow ranking based on the discard to landings ratio.

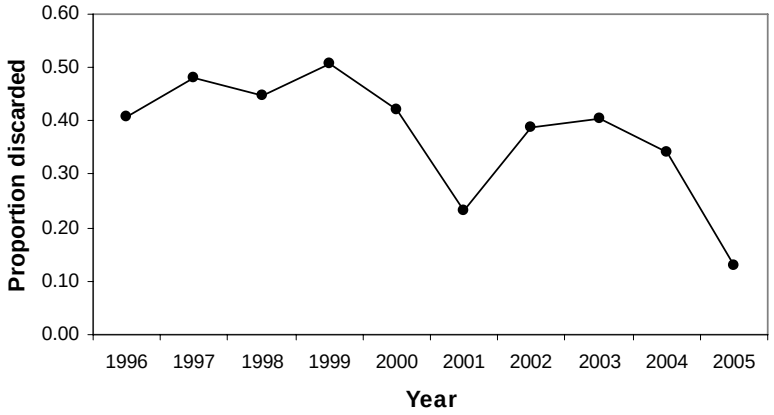

Figure 3. Proportion of arrowtooth flounder discarded in British Columbia's commercial bottom trawl fishery from 1996-2005. Source: PacHarvTrawl database.

Factor 2: Population Consequence of the Bycatch

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

Factor 3: Trends in Bycatch Rates

The bycatch rate has been stable from 1996 to 2004 (Figure 4). The decrease in arrowtooth flounder discarding will result in an overall decrease in the bycatch rate. Overall the bycatch rate is considered to be stable and therefore this factor receives a yellow ranking.

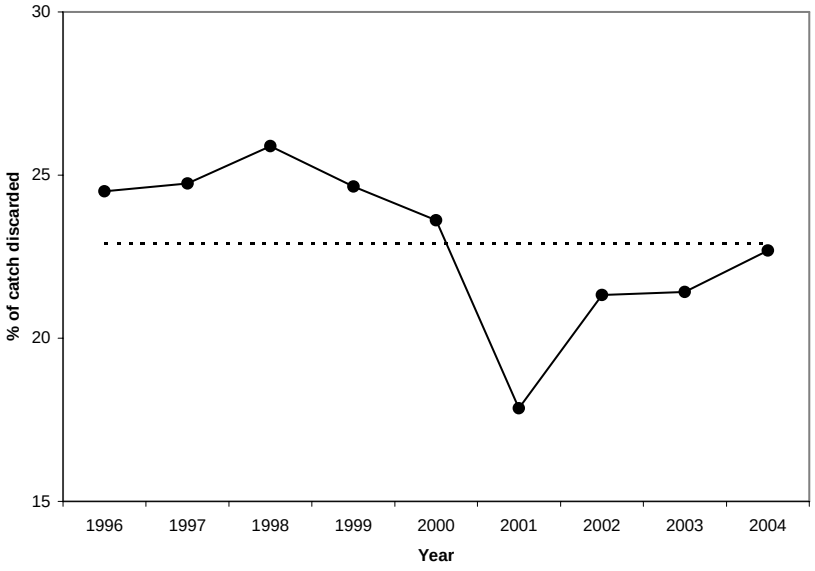

Figure 4. Percentage of total catch (by weight) discarded in British Columbia's commercial bottom trawl fishery. Dotted line represents the series average. Source: PacHarvTrawl database.

Secondary Factor: Ecosystem Impacts

There is little doubt that the discarding and relocation of ~9000 t/year of biomass taken by bottom trawls 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

Primary Habitat Factors

Factor 1: Impacts of Fishing Gear on Habitat.

Approximately 99.9% of arrowtooth flounder are taken by the bottom trawl fishing method (PacHarvTrawl database, unpublished data). This method is widely known to disrupt bottom habitat and is therefore 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 (>50m) on a variety of substrates (Figures 5 & 6) (Sinclair et al. 2005). The resilience to bottom trawling varies by habitat type. Arrowtooth flounder are mostly associated with *Holocene mud* (Sinclair et al. 2005). The resilience of this habitat type to disturbance from bottom trawling is unknown. Arrowtooth flounder, although mostly associated with soft-bottom substrates, are widespread and can be caught over a variety of habitats. For precautionary purposes this factor is evaluated at the scale of the entire bottom trawl fishery until which time the proportion of arrowtooth flounder landings by habitat type are known.

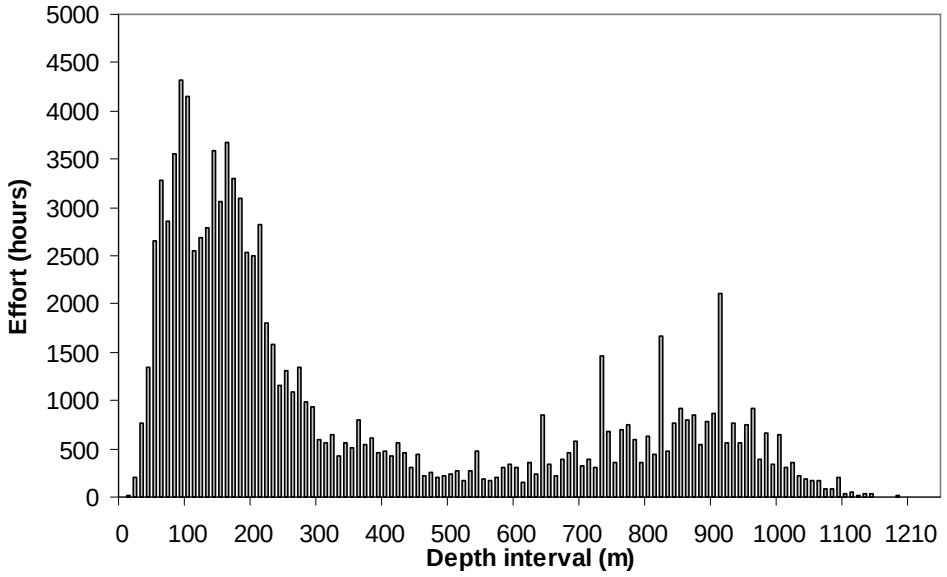

Figure 5. Trawl effort by depth in British Columbia's commercial bottom trawl fishery. Source: DFO PacHarvTrawl database.

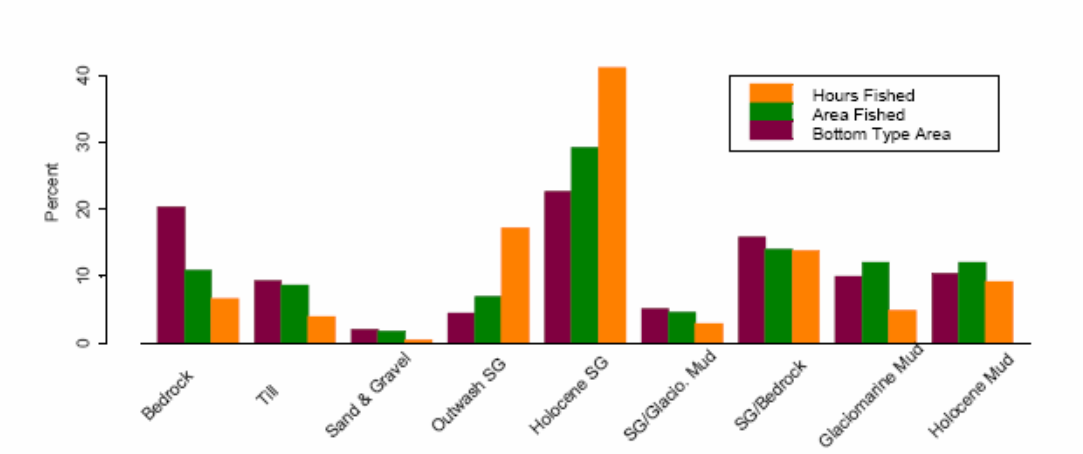

Figure 6. Spatial extent of surficial units and the bottom trawl fishery over these units in Hecate Strait and Queen Charlotte Sound. The fishery distribution of the fishery is described by the area fished and by the distribution of fishing effort (hours). The upper panel shows the percent distribution 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 (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 considered to be low and therefore this factor receives a red ranking.

Factor 3: Spatial Extent of the Impact.

The commercial trawl catch for arrowtooth flounder is very widespread occurring over 82 000 km^2 based on 10X10 km grid squares (Figure 7). The gear impacts occur over large spatial scale and therefore this factor receives a red ranking.

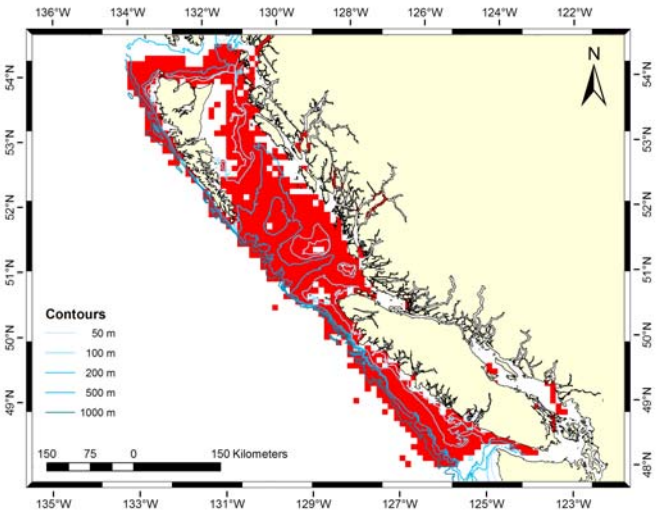

Figure 7. Distribution of arrowtooth flounder on a 10 x 10 km grid based on catches in the commercial trawl fishery (1996-2004). Source: Olsen (2005).

Primary Ecosystem Factors

Factor 1: Disruption of food webs.

There are no demonstrated ecosystem impacts from the removal of arrowtooth flounder. This species undoubtedly plays a very important ecological role simply as a function of their large biomass and presence in a variety of habitats and depths. Overall the ecosystem impacts of 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 in Canada's Pacific waters 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: on Habitats and Ecosystems	
Factors to Evaluate	**Ranking**
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 Rank	

Criterion 5: Effectiveness of the Management Regime

Factor 1: Stock Assessments

A stock assessment research paper on arrowtooth flounder was assembled early in 2006. This paper however was not accepted by the internal DFO peer-review process and therefore there is no current stock assessment for this species. There are several fisheries independent trawl surveys which regularly capture and index arrowtooth flounder populations however these data are not readily available. With the recent increase in arrowtooth flounder catch it is readily apparent that a valid stock assessment needs to be undertaken. Developing a credible stock assessment is planned by DFO but has not yet been carried out. This factor receives a yellow ranking.

Factor 2: Scientific Monitoring

Scientific monitoring of arrowtooth flounder involves both fisheries independent and fisheries dependent data. Fisheries independent data involves regular (i.e., biennial) bottom trawl surveys which in recent years has expanded in coverage such that the main fishing areas are now surveyed. The trawl fleet has 100% observer coverage and therefore fisheries dependent data (i.e., CPUE, spatial distribution of the fleet, depth, etc.) is comprehensive and reliable. Overall, relative to most fisheries in the world, this fishery receives regular scientific monitoring. The shortcoming at present time is the timely use of these data in the application of developing a proper stock assessment. This factor receives a green ranking.

Factor 3: Scientific Advice

Arrowtooth flounder have never been managed through quotas or a total allowable catch (TAC) in British Columbia. Pre the 2005 fishing season, this species received little or no management attention. DFO groundfish science and management was unprepared for the sudden interest in this species and placed an in-season TAC of 20 000 t on arrowtooth flounder. Until which time a proper TAC is established based on a scientifically acceptable stock assessment this factor is given a red 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 arrowtooth flounder. 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 eastern Queen Charlotte Sound and Hecate Strait for the protection of sponge reefs (DFO 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 ~99.9% of the arrowtooth flounder catch. This fishery is subject to 100% onboard observer coverage as well as 100% dockside monitoring. The regulations of this fishery are well enforced. This category receives a green ranking.

Factor 7: Management Track Record

Arrowtooth flounder has only recently become valuable and therefore there has not been a long standing management track record. Stock productivity based on non-published survey indices and fisheries catch data suggests that stock productivity has been maintained but this is not due to directed management. In 2005, DFO set an in-season TAC on this species which was extremely high given the lack of a credible stock assessment and the historical catch levels. This factor is given a yellow ranking until such time that a credible TAC is ascertained.

Table 2. Commercial harvest management measures for the arrowtooth flounder fishery.

Management Jurisdictions & Agencies	Total Allowable Catch	Gear Restrictions	Trip Limit	Area Closures	Sources
DFO	Pre-2005: None In season 2005: 20 000 t	No restrictions. Caught almost exclusively by bottom trawl.	None	Some trawl closures.	DFO 2005

Synthesis

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 Effectiveness of the Management Regime	

Overall Evaluation and Seafood Recommendation

Arrowtooth flounder are an abundant widespread flatfish occurring throughout Canada's Pacific waters. They are caught almost exclusively by bottom trawls. Prior to 2005 this species was caught primarily as bycatch but was not normally targeted. Increased prices and developing markets in 2005 resulted in a tripling of the landings. They have a low inherent vulnerability to fishing pressure due to a fast growth rate, high fecundity, and a low age of first maturity. The status of the stocks appears to be in stable shape based on catch data and one long term biomass index. There are hundreds of species caught in association with arrowtooth flounder of which about 23% by weight are discarded. There are presently no legally-protected threatened species captured in this fishery. Capturing of arrowtooth flounder by use of bottom trawls causes a large scale disruption of bottom habitat. Management has not appropriately dealt with the surge of interest in this species. Overall this species receives a seafood ranking of high conservation concern. This ranking may be improved upon in the future with the implementation of suitable management measures.

Table of Sustainability Ranks

	Conservation Concern			
Sustainability Criteria	**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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