



Northern Shrimp
(*Pandalus borealis*) - Div. OB to 3K

Background

Northern or pink shrimp (*Pandalus borealis*) are found in the Northwest Atlantic from Davis Strait to the Gulf of Maine, usually in areas where the ocean floor is soft and muddy and where temperatures near the bottom range from about 2 to 6° C. These conditions occur throughout the Newfoundland - Labrador offshore area within a depth range of roughly 150 - 600 m, thus providing a vast area of suitable habitat. The species is the primary cold-water shrimp resource in the north Atlantic.

These shrimp are protandrous hermaphrodites. They first mature as males, mate as males for one to several years and then change sex to spend the rest of their lives as mature females. They are known to live for more than 8 years in some areas. Some northern populations exhibit slower rates of growth and maturation but greater longevity results in larger maximum size.

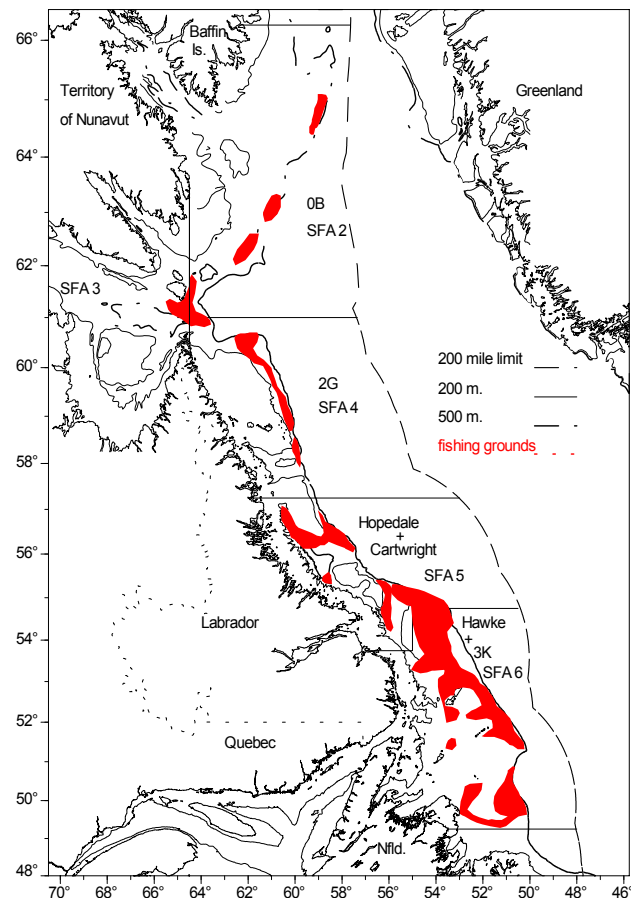
During the daytime, northern shrimp rest and feed on or near the ocean floor. At night, substantial numbers migrate vertically into the water column, feeding on zooplankton. They are important prey for many species such as Atlantic cod, Greenland and Atlantic halibut, skates, wolf fish and harp seals.

Status of the resource for each shrimp fishing area (SFA) is determined by monitoring performance of the fishery within and between years, distribution of fishing effort and the size/age/sex composition of the catches. Also, research trawl surveys since 1995 provide data on stock size and structure for some areas. Using both sources of information, inference can be made on state of the spawning stock (female abundance), potential for future recruitment to the fishery (male abundance) and level of exploitation (catch-to-fishable-biomass ratios).

The fishery for northern shrimp is managed within a three-year (2000 - 2002), integrated plan. Stock status was assessed prior to the implementation of the plan (DFO, 2000), providing information used for the determination of TAC's in each shrimp fishing area (SFA).

TAC's for the 2001 fishery remained at 2000 levels, for SFA's 4 (Div. 2G), 5 (Hopedale and Cartwright Channels) and 6 (Hawke Channel + Div. 3K). The TAC within SFA 2 (Div. 0B) increased to 8750 t from 5250 t in 2000 with the establishment of a 3500 t exploratory TAC east of 63°W.

The assessment conducted in March, 2002 compared the 2001 fishery and research survey data to those of previous years to determine if significant changes in stock status have occurred and if TAC changes should be considered for the third year of the multi-year plan.



Summary

SFA 6 (Hawke Channel + Div. 3K)

- Shrimp biomass and abundance indices from research vessel surveys increased over the 1997 – 2001 period, while commercial catch rates remain stable at a high level since 1995.
- The 1996 year-class is weak but the 1997 - 1999 year-classes are strong.
- Any negative effect of the weak 1996 year-class, on the spawning stock, should be buffered by the residual female biomass and recruitment from the 1997 year-class.
- Predation mortality is unknown. The abundance of known fish predators (e.g. cod, redfish, skate and American plaice) remains low in the offshore. However, the harp seal population has increased.
- Warmer conditions, which have persisted since 1996, could negatively impact distribution, growth, survival, sex change and future catch rates.
- Recent catches have had no observable impact on the resource. Removals at the current level will not likely increase the exploitation rate.

SFA 5 (Hopedale and Cartwright Channels)

- Survey biomass and abundance indices for 2001 were substantially higher than observed for the 1997 – 1999 period. Commercial catch rates have increased since the early 1990's.
- The 1997 and 1998 year-classes appeared strong in 2001.

- The female spawning stock biomass index has almost doubled since 1999.
- Predation mortality is unknown. The abundance of known fish predators (e.g. cod, redfish, skate and American plaice) remains low in the offshore. However, the harp seal population has increased.
- A positive correlation between ice cover and commercial catch rates, 6 years later, has been observed. Ice coverage during the 1996 – 2001 period has been below normal. Catch rates could decline gradually or remain stable over the next several years.
- Recent catches have had no observable impact on the stock. Removals at the current TAC of 15,300 t will likely result in a reduced exploitation rate in 2002.

SFA's 2 and 4 (Div. 0B and 2G)

- No research surveys were conducted in these areas during 2001.
- Commercial catch rates from large vessels (> 500 t) in SFA 4 were higher in 2000 and 2001 than they were in 1998 and 1999, while those in SFA 2 increased from 1993 – 1996 and have remained stable thereafter.
- No estimates of strengths of recruiting year-classes are available.
- Changes in areas fished within and between years and the mixed fishery for *Pandalus borealis* and *P. montagui* off Resolution Island increases uncertainty in interpretation of catch rate data for SFA 2.

- The level of exploitation is uncertain for these areas but recent catches have had no observable impact on the resource in SFA 4.

SFA 6 (Hawke Channel + Div. 3K)

Commercial Fishery

Catches increased from about 1800 t in 1987 to more than 7800 t in 1988 and ranged between 5500 and 8000 t from 1989 to 1993. The TAC for SFA 6 in the 1994 - 1996 Management Plan was set at 11,050 t annually and catches were approximately 11,000 t in each of those three years. The TAC for 1997, the first year of the 1997 - 1999 multi-year plan, was raised to 23,100 t as a first step toward increasing the exploitation on a healthy resource. Most of the increase was reserved for the development of a small vessel (<500 t) component.

The catch in 1997 was approximately 21,200 t, of which about 6100 t was caught by the small vessel fleet.

Despite the large increase in catch, relative exploitation (the ratio of nominal catch to projected fishable biomass index) in 1997 remained low and the TAC for 1998 was increased again by 100% to 46,200 t. Catches of approximately 46,300 t were taken with the expanding small vessel sector taking about 30,000 t.

The 1999 TAC was increased (27%) to 58,632 t. Due to operational problems, the small vessel sector failed to take the 41,029 t allocation, being short by 7400 t, whereas the large vessel (>500 t) fleet took all of its 17,600 t allocation.

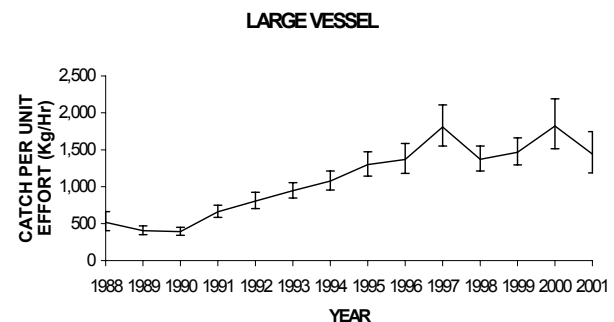
In 2000, the TAC was increased by 5% to 61,632 t. Catches totaled 63,266 t; 20,615 t

by large vessels and 42,651 t by small vessels.

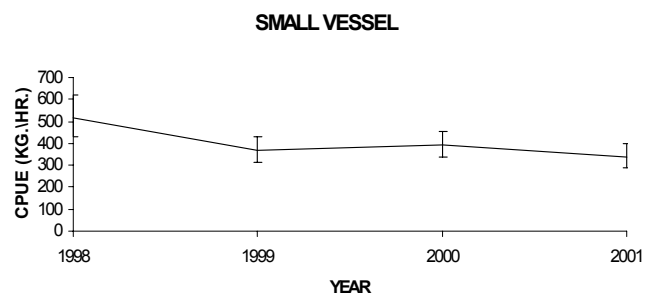
The 2001 TAC remained at 61,632 t. Preliminary data indicate that the large vessel fleet took 19,900 t, whereas, the small vessel fleet took approximately 32,700 t. There was a glut in the international market for peeled, frozen shrimp. Therefore, industry imposed a small vessel shrimp closure that lasted between the beginning of July and the end of September.

Resource Status

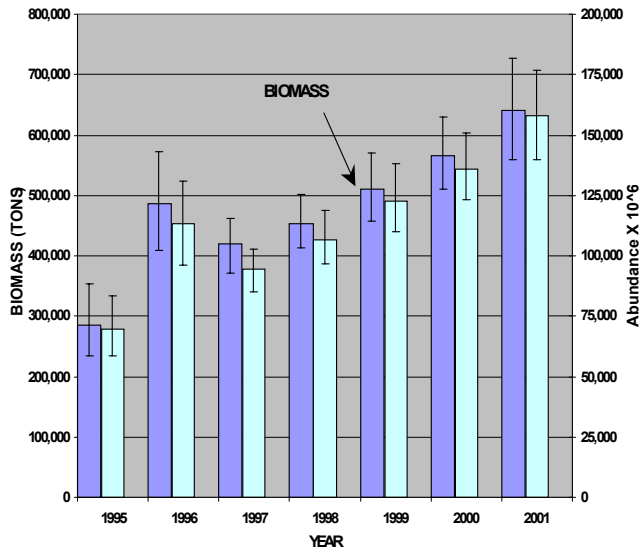
Large vessel catch rates increased up to 1995 and have since stabilized at a high level.



Catch rates for small vessels have remained stable since 1998.



Research survey biomass and abundance indices have shown an increase since 1997. The lower 95% confidence limit averaged approximately 453,500 t (109 billion animals) over the 1996 – 2001 period.



Research and commercial data, for 2001, indicated that the 1995 year-class was stronger than expected. The 1996 year-class appeared weak compared to others produced during the 1990's. The biomass and abundance of males should be maintained in the next few years, by the strong 1997 - 1999 year-classes. The 1997 year-class, at age 4 in 2001, is at least as strong as the 1993 and 1994 year-classes at age 4 in 1997 and 1998 respectively.

The 2002 large vessel fishery is reported to be performing well with preliminary catch rates maintained at the high levels observed, for similar periods, in recent years.

Sources of Uncertainty

It is unknown whether the weakness of the 1996 year-class will be reflected in the 2002 fishery.

A high proportion of the small vessel catch is comprised of males. Possible impacts of prolonged fishing, of this component, upon future stock size and composition are unknown.

Outlook

The resource in this area remains healthy with high biomass and abundance of both sexes. Exploitation has likely been less than 15% over the past several years.

Over the next few years, the residual female biomass and the strong 1997 - 1999 year-classes should buffer the negative effect of the weak 1996 year-class.

Management Considerations

Removals at the current TAC (61,632 t) will not likely increase the exploitation rate.

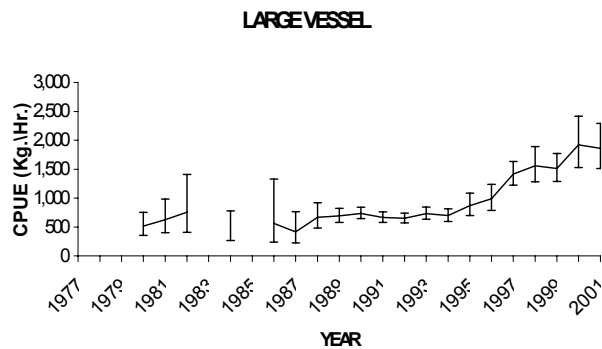
SFA 5 (Hopedale and Cartwright Channels)

Commercial Fishery

Shrimp **catches** in Hopedale and Cartwright Channels increased from about 2700 t in 1977 to 4100 t in 1980, declined to 1000 t in 1983 and 1984, increased again to 7800 t in 1988 and then stabilized at approximately 6000 t during 1989 - 1993. The TAC's for the 1994 - 1996 management plan, which combined the two channels as a single management area, were increased to 7650 t annually and catches subsequently increased, averaging 7500 t during that period. Annual TAC's for the 1997 - 1999 plan were increased by 100% to 15,300 t and catches of approximately 15,000 t were taken each year. This TAC was maintained during the first two years of the 2000 - 2002 plan. Approximately 15,000 t were taken each year.

Resource Status

Commercial catch rates were stable from the mid 1980's to the early 1990's and have since increased, reflecting an overall increase in the resource during the past decade.



A multispecies research trawl survey was conducted in SFA 5 during 2001. Biomass and abundance indices for 2001 were substantially higher than those observed for the 1997 – 1999 period.

Biomass and abundance of males should be maintained in 2002 - 2003 due to the strong 1997 and 1998 year-classes. The spawning stock indices almost doubled since 1999 indicating that the spawning stock is healthy.

The 2002 large vessel fishery is reported to be performing well with preliminary catch rates maintained at the high levels observed, for similar periods, in recent years.

Sources of Uncertainty

The observed increases in 2001 research survey biomass/ abundance indices are thought to be real. However, the influences of:

1. conducting the SFA 5 portion of the fall survey in December rather than October; and
2. not occupying 10 planned survey sets, in the southeastern portion of Div. 2H,

are unknown.

Outlook

Ratios of nominal catch to projected fishable biomass index were less than 20% between 1997 and 2000. The northern portion of

SFA 5 was not surveyed in 2000, therefore, it was not possible to make an estimate for 2001. The catchability, of shrimp, by the research trawl is believed to be <1 , therefore, exploitation rate has likely been low.

The current status of the northern shrimp resource in the Hopedale and Cartwright Channels appears favourable from the 2001 fishery and research data. Positive effects of the 1997 and 1998 year-classes, on the female stock, should be evident by 2003 and 2004.

Management Considerations

Recent catches have had no observable impact on the stock. Removals at the current TAC (15,300 t) will likely reduce the exploitation rate in 2002.

SFA 4 (NAFO Division 2G)

Commercial Fishery

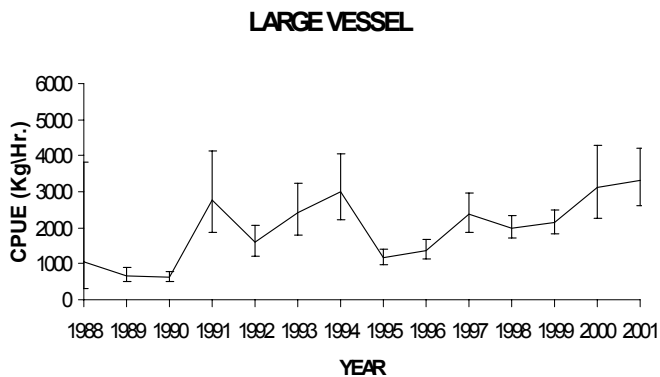
Shrimp catches increased from 1083 t in 1988 to 3842 t in 1989 and remained within the 2500 - 3000 t range up to and including 1993. The 1994 catch increased to 3982 t with an increase in TAC to 4000 t in the first year of the 1994 - 1996 Management Plan. A second increase to 5200 t for 1995 and 1996 resulted in catches of about 5100 t in both years. The TAC of 5200 t was maintained for 1997 and catch was estimated at 5217 t.

In 1998 the TAC was increased to 8320 t. Seventy percent of the increase (2184 t) was applied to the area south of 60° N where very little fishing had occurred after 1990. Catches from 1998 to 2001 were reported to be about 8000 t each year.

Resource Status

Commercial fishery data indicated that catch rates in 2000 and 2001 were higher than they were in 1998 and 1999.

No research trawl survey was conducted in SFA 4 in 2001.



Sources of Uncertainty

Current status is uncertain because no surveys have been conducted in SFA 4 since fall 1999, precluding evaluation of stock size and relative level of exploitation. Prospects are uncertain because lack of a recruitment index precludes projections.

Outlook

The spawning stock appears healthy, as evidenced in continued high commercial catch rates of large female shrimp, which increased since 1996.

Management Considerations

Lacking research trawl surveys in 2000 and 2001, it is not possible to evaluate the impact of catches in 2001. Recent catches have had no observable impact.

SFA 2 (NAFO Division 0B)

Commercial Fishery

Catches of *Pandalus borealis* in Div. 0B increased from about 2800 t in 1988 to 3000 t in 1989 but subsequently declined to 100 t in 1993. In 1994, catch remained below 500 t but increased substantially to about 3600 and 3200 t in 1995 and 1996, respectively, and to more than 5000 t each year from 1997 to 2000. TAC's remained at 3500 t from 1989 to 1996 but were increased experimentally to 5250 t for 1997 and 1998. In 1999, an additional 3500 t were provided for the area north of 63° N as an incentive for the large vessel fleet to return to grounds not fished extensively since 1995. However, only 105 t were taken from this area in 1999. In 2000, the additional 3500 t was not included in the quotas. Catches north of 63° N (237 t) were not counted against the TAC for the southern area (5250 t).

In 2001, an additional 3,500 t was included in the TAC as an exploratory quota east of 63°W. Preliminary data suggest that approximately 5,700 t were taken in the area near Resolution Island, while only 640 t were taken in the exploratory area.

Recent catches for the species have been estimated, in part, from the mixed *P. borealis/ montagui* fishery data for the area east of Resolution Island. Therefore, the accuracy is questionable. *Pandalus borealis* taken in the areas immediately adjacent to SFA 2 were included in the catches reported for that shrimp fishing area.

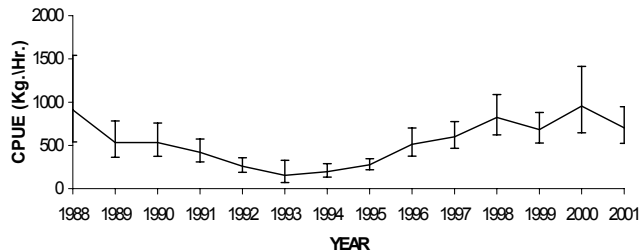
Resource Status

Although shrimp concentrations in the northeast are elusive, as evidenced by the low catch in recent years from the areas north of 63° N and east of 63° W, those

adjacent to eastern Resolution Island have persisted since 1995.

Catch rates of both sexes have been maintained at a high level since 1996.

LARGE VESSELS



No research trawl surveys have been conducted in SFA 2.

Sources of Uncertainty

The population structure is uncertain throughout Div. 0B and distribution is unknown for much of the year.

The mixed fishery for *Pandalus borealis* and *P. montagui* confounds the assessment and the lack of knowledge on the distribution and abundance and biomass of both species will persist in the absence of a time series of research trawl surveys.

Outlook

Although commercial catch rates were favourable, the current status of this resource remains uncertain and prospect for the future remain unknown.

Management Considerations

In the absence of research trawl surveys, it is not possible to evaluate the impact of recent catches.

Industry Perspective

The northern shrimp fishery has expanded rapidly since 1997 and now accounts for a major portion of the landed value of fish product in Newfoundland and Labrador. The fishery continues to develop and opportunities exist for further expansion in the north (2GH, 0B). Industry has expressed in the past its disappointment about the Department of Fisheries and Oceans decision to reduce the frequency of research surveys in Division 2H to every second year and to discontinue surveys entirely in Division 2G. Industry continues to view this approach as a limitation on the development of the northern shrimp fishery that results in lost economic opportunity for its participants. The restoration of scientific surveys in the north is a necessary measure to ensure the development of northern fisheries.

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NOTE: Table below must not be considered in isolation from the text of the Stock Status Report due to the risk of erroneous interpretation of overall stock status.

Newfoundland Region (2002)

Northern Shrimp in Hawke + 3K (SFA 6)

Catch	Increased from 11,000 t during 94-96 to 63,300 t in 2000 but decreased to 52,600 t (TAC not met in small vessel (<500 t) fleet) in 2001.		
Effort	Increased from 1996 to 2001 with the increases in TAC. New effort primarily due to small vessels (<500 t). Some double trawling (< 5% of large vessel (>500t) effort since 1997) and low use of windows.		
By Catch	The mandatory use of sorting grates on shrimp vessels and low groundfish abundance in this area minimize the bycatch. Fishermen avoid situations where there is a potential by-catch problem. Greenland halibut and redfish bycatch by the small vessel fleet was negligible.		
INDEX	OBSERVATION	INTERPRETATION	EVALUATION
FISHERY DATA			
CPUE index	Increased for large vessels up to 1995 and has since remained stable at a high level. Small vessel CPUE stable since 1998.	Reflect an increase in the resource up to the mid 1990's, remaining at a high level since.	+
Spatial pattern	Effort widespread throughout the management area for both fleets.	Reflect widespread distribution and high density of shrimp over a large area.	+
Temporal pattern	A winter-spring fishery for large vessels and a spring - fall fishery for small vessels.	High concentrations of shrimp available throughout the year.	+
Male abundance	Age 5 males dominated catches in most years; age 4 males dominated catches in 2001.	Reflect the strong 97 year-class (age 4 in 2001) and the weak 96 year-class.	?
Female abundance	Catch rates of the female component increased up to 1995 and have since remained relatively stable, at a high level.	Continued good recruitment since the mid-to-late 1980's explains the increase in spawning stock through the 90's. Spawning component remains healthy.	+
Female stock characteristics	The mean size of females and the median size at sex change have declined since 1996 (data from large vessel fleet).	Likely reflect a change in growth and size at sex change.	?
RESEARCH DATA			
Biomass/abundance index	Biomass/abundance indices increased since 1997 and the lower 95% confidence intervals averaged about 453,500 t/109 billion animals over the 1996 – 2001 period.	Biomass/abundance remains at a high level, increasing since 1997.	+
Spatial pattern	Widely distributed throughout the management area. Distribution patterns vary between years. Areas of high density increasing.	Reflect higher stock size.	+
Recruitment (male age structure)	The 2000 year-class at age 1 appears weaker than the strong 1997 – 1999 year-classes. The 1996 year-class was the weakest observed.	Biomass/abundance of males should be maintained in the next few years due to the strong 1997 – 1999 year-classes.	+
Spawning stock (females)	The female stock index increased from an estimated 177,000 t (21 billion animals) in 1997 to 342,000 t (50 billion) in 2001.	The 1995 year-class was stronger than expected; residual female biomass and recruitment from the 1997 year-class may buffer weak 1996 year-class.	+
OTHER FACTORS			
Predation	Abundance of known fish predators (e.g. cod, redfish, skate, and American plaice) remains low in the offshore. Harp seal population has increased.	Predation mortality is unknown.	?
Environment	After 1995, temperatures have increased and this could impact distribution, growth, survival and sex change.	Uncertainty.	?
Industry perspectives	Large vessel catch rates in Jan/Feb. 2002 continue to be among the highest observed, but sizes again are reported to be small.	The resource is perceived to be healthy by both the small and large vessel operators.	+
ASSESSMENT			
Exploitation Rate	Ratios of nominal catch/ beginning of year median fishable biomass index were less than 15% since 1996.	Catchability of the survey gear is believed to be less than 1. Therefore, exploitation rate likely has been low.	+
Stock Status	Current: High biomass/abundance of male and female component. The 1995 year-class was stronger than expected.	+	Concerns for current status/future prospect
	Prospect: The 1997 – 1999 year-classes appear strong.	+	Uncertainty regarding index quality or impact
			Positive evaluation

Recent catches have had no observable impact on the stock. Removals at the current level will not likely increase the exploitation rate.

NOTE: Table below must not be considered in isolation from the text of the Stock Status Report due to the risk of erroneous interpretation of overall stock status.

Newfoundland Region (2002)

Northern Shrimp in Hopedale + Cartwright Channels (SFA 5)

Catch	Increased from about 7500 t during 1994 - 96 to 15,000 from 1997 – 01 in response to TAC increase. Over the past decade, TAC's have been reached each year.		
Effort	Effort remained stable since 1990. Some indication of double trawling (<10% of total effort each year since 1997) and low use of windows.		
By Catch	The mandatory use of sorting grates on shrimp vessels and low groundfish abundance in this area minimize the bycatch. Fishermen avoid situations where there is a potential by-catch problem.		
INDEX	OBSERVATION	INTERPRETATION	EVALUATION
FISHERY DATA			
CPUE index	CPUE for large vessels has increased since the early 1990's.	Reflect an increase in the resource over the past decade.	+
Spatial pattern	Area fished by the large vessel component has remained broad since the 1990's.	Reflect widespread distribution and high density of shrimp over a large area.	+
Temporal pattern	Primarily a winter-spring fishery for the large vessel fleet since 1995; previously a summer fall fishery.	High concentrations of shrimp available throughout the year.	+
Male abundance	Age 5 males dominated catches in most years; age 4 males dominated catches in 2001.	Reflect the strong 97 year-class (age 4 in 2001) and the weak 96 year-class.	?
Female abundance	Catch rates of females increased since the early 1990's.	Continued good recruitment since late 1980's is responsible for the increase in spawning stock throughout the 1990's. Spawning component remains healthy.	+
Female stock characteristics	The mean size of females declined between 93-97 and remained stable since (large vessel fleet). Narrow size distribution of females in 2000 & 2001.	Reflect stable growth rate for current female year-classes. Female component in 2000 & 2001 comprised of fewer older ages (7+).	?
RESEARCH DATA			
Biomass/ abundance index	Biomass/ abundance indices for 2001 are substantially higher than observed for the 1997 – 1999 period.	Despite inconsistencies in the survey, biomass and abundance increased.	+
Spatial pattern	High densities within the channels and along the shelf edge.	Reflect high stock size within the preferred habitat.	+
Recruitment (male age structure)	The 1997 and 1998 year-classes appeared strong in 2001.	Biomass/abundance of males should be maintained in 2002/2003 due to the strong 1997 – 1998 year-classes.	+
Spawning stock (females)	The female stock indices almost doubled since 1999.	The spawning stock biomass has increased and is healthy.	+
OTHER FACTORS			
Predation	Abundance of known fish predators (e.g. cod, redfish, skate, and American plaice) remains low in the offshore. Harp seal population has increased.	Predation mortality unknown.	?
Environment	Positive correlation between ice cover and CPUEs six years later. Below normal ice coverage during the 1996 - 01 period.	Catch rates could decline gradually or remain stable over the next several years.	?
Industry perspectives	Catch rates from the 2002 fishery for Jan/ Feb continue to be high.	Stock remains healthy.	+
ASSESSMENT			
Exploitation Rate	Ratios of nominal catch/ beginning of year fishable biomass index were <20% between 1997 & 2000. No survey in 2000 therefore no estimate for 2001.	Catchability of the survey gear is believed to be less than 1. Therefore, exploitation rate likely has been low.	+
Stock Status	Current: Appears favourable from the fishery data and 2001 survey data.	+	Concerns for current status/future prospect -
	Prospect: The 1997 and 1998 year-classes appear strong.	+	Uncertainty regarding index quality or impact ?

Recent catches have had no observable impact on the stock. Removals of 15,300 t will likely reduce the exploitation rate in 2002.

Positive evaluation



NOTE: Table below must not be considered in isolation from the text of the Stock Status Report due to the risk of erroneous interpretation of overall stock status.

Newfoundland Region (2002)

Northern Shrimp in Division 2G (SFA 4)

Catch	Increased from about 5200 t during 1995 - 1997 to 8000 from 1998 to 2001. Over the past decade, TAC's have been reached each year.		
Effort	Effort increased after 1994 and has since varied at a higher level. Incidence of double trawling and windows remains low based on observer data.		
By Catch	The mandatory use of sorting grates on shrimp vessels and low groundfish abundance in this area minimize the bycatch. Fishermen avoid situations where there is a potential bycatch problem.		
INDEX	OBSERVATION	INTERPRETATION	EVALUATION
<i>FISHERY DATA</i>			
CPUE index	Catch rates in 2000 and 2001 were higher than they were in 1998 and 1999.	Possibly reflect a recent increase in the resource.	+
Spatial pattern	Increased effort south of 60° N from 1998 to 2001 due to partitioning of the quota.	Reflect the existence of high concentrations of shrimp along the shelf slope.	+
Temporal pattern	Fishery occurs when ice conditions permit.	High shrimp concentrations available throughout the open season.	+
Male abundance	The proportion of males in the catch varies between years and tends to be lower than observed in management areas to the south.	Fishery does not occur in areas where males are abundant; rather it occurs in areas where large females are found.	+
Female abundance	Catch rates of females have increased since 1996.	Despite the fishery targeting large females, the spawning stock appears healthy.	+
Female stock characteristics	Average length of females and median size at sex inversion have declined since 1994. Narrow distribution of female sizes in 2000 & 2001 compared to previous years.	Reasons for the decline are unclear. One factor may be the shift of effort to south of 60°N. Females in 2000 & 2001 comprised of fewer older ages.	?
<i>RESEARCH DATA</i>			
Biomass/ abundance index	No surveys since 1999		No Evaluation Possible
Spatial pattern			
Recruitment (male age structure)			
Spawning stock (females)			
<i>OTHER FACTORS</i>			
Predation	Abundance of predators/competitors of shrimp not well known in this area.	No inference for predation mortality.	None
Environment	Limited oceanographic data for this area.	Cannot be evaluated.	None
Industry perspectives	Significant increases in catch rates over a wide area noted south of 60°N in 1999 and 2000. This trend continues.	Industry is very encouraged by recent catch rates and indications of higher abundances in the south.	+
<i>ASSESSMENT</i>			
Exploitation Rate	This area has not been surveyed since 1999.	No inference for level of exploitation.	None
Stock Status	Current: Appears favourable from the fishery data but the lack of a research survey creates uncertainty.	?	Concerns for current status/future prospect -
	Prospect: Lack of recruitment index does not allow projection.	?	Uncertainty regarding index quality or impact ?

Recent catches have had no observable impact on the stock. Lacking surveys, it is not possible to evaluate level of exploitation.

Positive evaluation +

NOTE: Table below must not be considered in isolation from the text of the Stock Status Report due to the risk of erroneous interpretation of overall stock status.

Newfoundland Region (2002)

Northern Shrimp in Division 0B (SFA 2)

Catch	Increased from about 3200 t in 1996 to 5300 from 1997 to 1999 in response to TAC increase. TAC's attained from 1995 - 1998. An exploratory fishery east of 63° W was established in 2001 (3500 t quota). Catch estimate for 2001 is preliminary. Fishery mixed with <i>P. montagui</i> in the southwest.		
Effort	Remained stable since 1996. "Target species" is, at times, uncertain. Double trawling occurs east of 63 °W; use of windows estimated to be low.		
By Catch	Small fish (especially redfish) are retained by the small-meshed gear from time to time in this area. However, the mandatory use of sorting grates on shrimp vessels minimizes bycatch. In practice, fishermen avoid situations where there is a potential bycatch problem.		
INDEX	OBSERVATION	INTERPRETATION	EVALUATION
FISHERY DATA			
CPUE index	Increased from 1993 to 1996 and remained relatively stable thereafter.	Possibly reflect recent stability in the resource.	+
Spatial pattern	Since 1998 the grounds fished remained the same. Southwest fished extensively since 1995, targeting dense concentrations of <i>P. montagui/borealis</i> east of Resolution Island.	Fishing opportunities appear to be in limited areas.	?
Temporal pattern	A summer-fall fishery. Ice covered in winter and spring.	Distribution unknown for much of the year.	?
Male abundance	Over the past five years, catch rates of males have been high and relatively stable.	Male abundance stable at a high level.	+
Female abundance	Over the past five years, catch rates of females have been high and relatively stable.	Female abundance stable at a high level.	+
Female stock characteristics	Mean size of females and median size at sex change declined between 1993 & 1998, stabilized since. Narrow size distribution in 2000 & 2001 compared to previous years	Population structure and boundaries uncertain. Fewer older females in the 2000 & 2001 catches.	?
RESEARCH DATA			
Biomass/abundance index	No Data		No Evaluation Possible
Spatial pattern			
Recruitment (male age structure)			
Spawning stock (females)			
OTHER FACTORS			
Predation	Abundance of predators/competitors of shrimp not well known in this area.	No inference for predation mortality.	None
Environment	Limited oceanographic data.	Cannot be evaluated.	None
Industry perspectives	Industry notes high catch rates and good quality shrimp in this area since 1994.	Stock abundance appears stable at a high level.	+
ASSESSMENT			
Exploitation Rate	No biomass indices available for this area.	Exploitation rate is unknown.	None
Stock Status	Current: Appears favourable from the fishery data but the absence of surveys creates uncertainty.	?	Concerns for current status/future prospect —
	Prospect: Unknown.	?	Uncertainty regarding index quality or impact ?

Concerns for current status/future prospect —

Uncertainty regarding index quality or impact ?

Positive evaluation +

Without trawl surveys, it is not possible to evaluate the impact of recent catches.

Consensus of northern shrimp resource status - Div. 0B to 3K reached at RAP

NOTE: Table below must not be considered in isolation from the text of the Stock Status Report due to the risk of erroneous interpretation of overall stock status.

EVALUATION				
INDEX	HAWKE + 3K (SFA 6)	HOPE + CART (SFA 5)	DIV. 2G (SFA 4)	DIV. 0B (SFA 2)
FISHERY DATA				
CPUE index	+	+	+	+
Spatial pattern	+	+	+	?
Temporal pattern	+	+	+	?
Male abundance	?	?	+	+
Female abundance	+	+	+	+
Female stock characteristics	?	?	?	?
RESEARCH DATA				
Biomass/ abundance index	+	+	No Evaluation Possible	No Evaluation Possible
Spatial pattern	+	+		
Recruitment (male age structure)	+	+		
Spawning stock (females)	+	+		
OTHER FACTORS				
Predation	?	?	None	None
Environment	?	?	None	None
Industry perspectives	+	+	+	+
ASSESSMENT				
Exploitation Rate	+	+	None	None
Stock Status				
Current	+	+	?	?
Prospect	+	+	?	?

Concerns for current status/future prospect **—**
Uncertainty regarding index quality or impact **?**
Positive evaluation **+**