Northern Shrimp (*Pandalus borealis*) - Div. 0B to 3K Stock Status Update

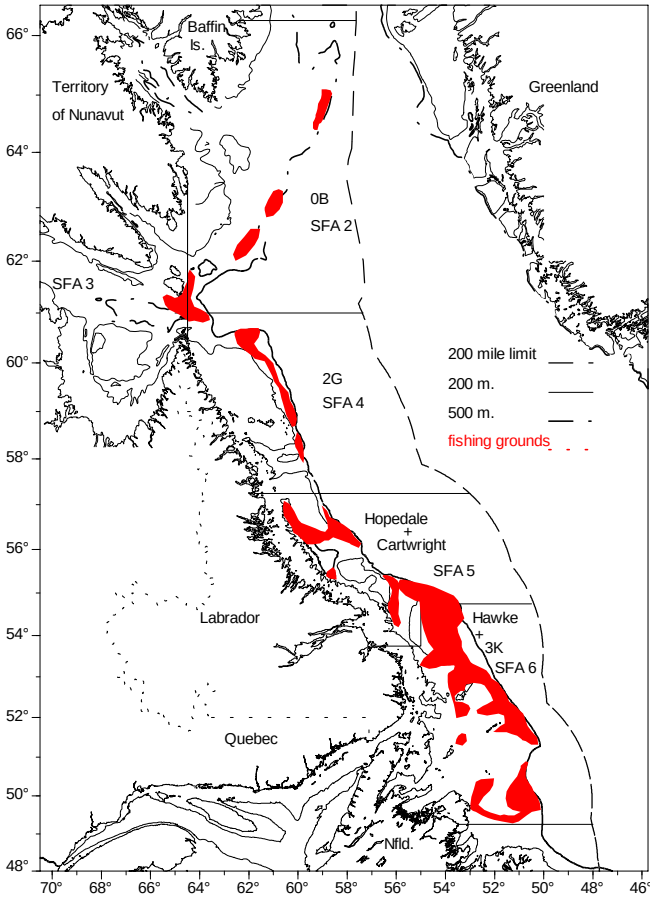
Introduction

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 2000 fishery were largely unchanged from previous levels in three of four management areas. The TAC in Hawke + 3K (SFA 6) was increased only slightly from about 59,000 tons to 61,000 tons.

The interim review (update) conducted in March, 2001 compared the 2000 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 second year of the multi-year plan.

This stock status update comprises the following sections: 1) a summary of the key results of the assessment; 2) a narrative describing the fishery with an expanded discussion of resource status and outlook and; 3) tables for each SFA providing detailed information on stock status indicators.



Summary

SFA 6 (Hawke Channel + Div. 3K)

- Shrimp biomass and abundance have been at high levels since the mid 1990's, possibly increasing from1997 to 2000.
- The 1996 year class is weak but the 1997 and 1998 year classes are strong.
- Predation of shrimp is assumed to be low in the offshore area.
- Warmer conditions, which have persisted since 1996, could impact

growth, survival, sex change and future catch rates.

- The strong 1997 and 1998 year classes should buffer an expected decrease in the female stock. However, the impact of fishing mortality on these year classes by the inshore fleet creates uncertainty about prospects.

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

SFA's 2 , 4 and 5 (Div. 0B to 2J north)

- No multispecies research surveys have been conducted in SFA 2 and surveys are incomplete or lacking in SFA's 4 and 5. No survey was conducted in SFA 4 (Div. 2G) or the northern portion of SFA 5 (Div. 2H) in 2000.

- Commercial fishery data from offshore vessels (> 500 tons) in recent years show continued high catch rates in all areas.

- No estimates of the strength of recruiting year classes are available.

- Predation of shrimp is assumed to be low in the offshore area of SFA 5 but the warmer conditions of recent years could impact growth, survival, sex change and future catch rates.

- Abundance levels of shrimp predators and competitors are not well known and limited oceanographic data exist for SFA's 2 and 4.

- Changes in areas fished within and between years and the mixed fishery for *Pandalus borealis* and *P. montagui* off Resolution Island increases uncertainty in SFA's 2 and 4.

- The level of exploitation is uncertain for these areas but catches prior to 2000 had no observable impact on the resource in SFA's 4 and 5.

Hawke Channel + Div. 3K (SFA 6)

Commercial Fishery

Catches increased from about 1800 tons in 1987 to more than 7800 tons in 1988 and ranged between 5500 and 8000 tons from 1989 to 1993, inclusive. The TAC for SFA 6 in the 1994 - 1996 Management Plan was set at 11,050 tons annually and catches were 11,000 tons 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 tons as a first step toward increasing the exploitation on a healthy resource. Most of the increase was reserved for the development of an "inshore" fleet component (< 65 ft.).

Catch in 1997 was reported to be approximately 21,200 tons, of which about 6100 tons was caught by the inshore fleet.

Despite the large increase in catch, relative exploitation (catch/survey biomass) in 1997 remained low and the TAC for 1998 was increased again by 100% to 46,200 tons. Catches of approximately 46,300 tons were taken with the expanding inshore sector reporting about 30,000 tons.

The 1999 TAC was increased further (27%) to 58,632 tons. Due to operational problems, the inshore sector failed to take the 41,029 ton quota, being short by 7400 tons, whereas the offshore fleet took all of its 17,600 ton allocation.

In 2000, the TAC was increased by 4% to 60,908 tons. Preliminary data indicate that about 63,000 tons were taken, 20,000 tons by the offshore fleet and 43,000 tons by the inshore sector.

Resource Status

Catch rates of large, offshore vessels increased from 1999 to 2000, remaining within the high level attained since 1995. Rates for inshore vessels showed an increase in 2000 compared to the previous two years.

Research survey biomass and abundance indices have shown an increase since 1997 with the lower 95% confidence intervals averaging approximately 446,000 tons (105 billion animals) over the 1996 – 2000 period.

Research data showed that the 1996 year class was weak compared to others produced during the 1990's. Also, the 1995 year class appeared weaker than most. However, the 1997 and 1998 year classes are strong, the former being the most abundant year class at age 3 within the time series.

The fishery in early 2001 by the offshore fleet is reported to be performing well with preliminary catch rates comparable to those reported for similar periods in recent years.

Sources of Uncertainty

Commercial length frequencies from the offshore fleet and from the research trawl survey in 2000 showed narrow size distributions for females compared to previous years. This suggests that the female component in 2000 was comprised of relatively few age classes.

Additionally, the inshore fleet caught a high proportion of small, male shrimp. Inshore catches accounted for two-thirds of the total catch. This contrasts the catch composition of the offshore fleet which targets larger males and females. Fishing smaller, younger shrimp has an unknown impact upon future stock size and composition.

Outlook

The resource in this area remains healthy with high biomass/abundance of male and female components. Further, exploitation likely has been less than 12% over the past several years (i.e. the ratio of nominal catch to the lower 95% confidence interval of the research trawl survey biomass index).

While it is likely that male abundance and biomass will be maintained in 2001/2002, it is expected that the female stock (possibly comprised of fewer age classes in 2000) will decrease as the weaker 1995 and 1996 year classes begin to contribute to this component, and year classes produced before 1995 are further reduced through both fishing and natural mortality.

Positive effects of the strong 1997 and 1998 year classes on the female stock should be evident by 2003.

Over the next few years, the residual female biomass and the strong 1997 and 1998 year classes should buffer the negative effects of the weaker 1995 and 1996 year classes. However, the impact of fishing mortality on younger animals by the inshore fleet creates uncertainty about prospects for this resource.

Management Considerations

Removals at the current level (about 63,000 tons) will not likely increase the exploitation rate, despite the potential for a decline in recruitment to the female stock component in 2001 and 2002.

Hopedale + Cartwright (SFA 5)

Commercial Fishery

Shrimp **catches** in Hopedale and Cartwright Channels increased from about 2700 tons in 1977 to 4100 tons in 1980, declined to 1000 tons in 1983 and 1984, increased again to 7800 tons in 1988 and then stabilized at roughly 6000 tons during the 1989 - 1993 period. The TAC's for the 1994 - 1996 management plan, which combined the two channels as a single management area, were increased to 7650 tons annually and catches subsequently increased, averaging 7500 tons during that period. Annual TAC's for the 1997 - 1999 plan were increased 100% to 15,300 tons and catches of approximately 15,000 tons were taken each year. The TAC for the first year of the 2000 – 2002 plan was maintained at 15,300 tons and preliminary data indicate that about 15,000 tons were caught.

Resource Status

Commercial catch rates, which were stable from the mid 1980's to the early 1990's, increased up to 2000, reflecting an overall increase in the resource during the past decade.

Strong recruitment of year classes produced throughout the 1990's resulted in high catch rates of males up to 1998. Since 1998, catch rates of males have decreased. Assuming the demographic structure in this area is similar to that observed in SFA 6, the decrease possibly was due to weaker 1995 and 1996 year classes. The spawning component appears healthy.

No multispecies research trawl survey was conducted in the northern portion of SFA 5 (Div. 2H) in 2000. Due to the short time series of trawl surveys, it is not yet possible to determine if trends observed within the Cartwright Channel (southern SFA 5) reflect conditions throughout the whole management area.

The fishery in early 2001 is reported to be performing well with preliminary catch rates comparable to those reported for similar periods in recent years.

Sources of Uncertainty

Due to the lack of a recruitment index, prospects for the future are uncertain.

Commercial length frequencies from the offshore fleet in 2000 showed narrow size distributions for females compared to previous years suggesting that the female component in 2000 was comprised of relatively few age classes.

Outlook

The current status of the northern shrimp resource in the Hopedale and Cartwright Channels appears favourable from the fishery data but the absence of a complete research trawl survey for 2000 creates uncertainty with respect to stock size and the level and effect of exploitation in 2000.

Management Considerations

Lacking a complete research trawl survey, it is not possible to evaluate the impact of catches in 2000. Catches prior to 2000 had no observable impact on the stock.

NAFO Division 2G (SFA 4)

Commercial Fishery

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

For 1998 the TAC was increased to 8320 tons. Furthermore, 70% of the increase (2184 tons) was applied to the area south of 60^0 N where very little fishing had occurred after 1990. Catches from 1998 to 2000 were reported to be about 8000 tons each year.

Resource Status

Commercial fishery data from offshore vessels in recent years show continued high catch rates in both northern and southern areas.

No research trawl survey was conducted in SFA 4 in 2000.

Sources of Uncertainty

Current status is uncertain because no survey was conducted in fall 2000, precluding evaluation of stock size and relative level of exploitation. Prospects also are uncertain because lack of a recruitment index (ages 1 and 2) precludes projections.

Outlook

The spawning stock appears healthy, as evidenced in continued high commercial catch rates of large female shrimp and stability in catch rates since 1997.

Management Considerations

Lacking a research trawl survey, it is not possible to evaluate the impact of catches in 2000. Catches in previous years had no observable impact.

NAFO Division 0B (SFA 2)

Commercial Fishery

Catches of *Pandalus borealis* in Div. 0B increased from about 2800 tons in 1988 to 3000 tons in 1989 but subsequently declined to 100 tons in 1993. In 1994, catch remained below 500 tons but increased substantially to about 3600 and 3200 tons in 1995 and 1996, respectively, and to more than 5000 tons each year from 1997 to 1999. Preliminary catch data indicate that the TAC of 5353 tons was taken in 2000.

TAC's remained at 3500 tons from 1989 to 1996 but were increased experimentally to 5250 tons for 1997 and 1998. In 1999, an additional 3500 tons were provided for the area north of 63^0 N as an incentive for the offshore fleet to return to grounds not fished extensively since 1995. However, only 105 tons were reported from this area in 1999. In 2000, the additional 3500 tons was not included in the quotas. The reported catch north of 63^0 N (237 tons) was not counted against the TAC for the southern area (5353 tons).

Recent catches for the species have been estimated, in part, from the mixed fishery data for *P. borealis/montagui* in the area east of Resolution Island but their accuracy is questionable. *Pandalus borealis* taken in the immediately adjacent areas of SFA's 3

and 4 were included in the catches reported for SFA 2.

Resource Status

Although shrimp concentrations in the northeast are elusive, as evidenced by the low catch in recent years from the area north of 63^0 N, those adjacent to eastern Resolution Island have persisted since first fished in 1995.

Catch rates of both males and females have been maintained at a high level since 1997.

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/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. Also, prospects for the future are 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 products in Newfoundland and Labrador. The resource continues to develop and opportunities exist for further expansion in the north (2GH, 0B). Industry is disappointed 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 views this 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 resources.

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Catch	Increased from about 11,000 tons during 1994 -1996 to over 60,000 in 2000 due to TAC increases. With few exceptions the TAC's were reached each year.
Effort	Increased from 1996 to 2000 with the increases in TAC. New effort primarily due to vessels < 65 feet. Some double trawling (< 5% of offshore 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 inshore fleet was negligible.

INDEX	OBSERVATION	INTERPRETATION	EVALUATION
FISHERY DATA			
CPUE index	Increased for offshore fleet up to 1995 and has since remained relatively stable at a high level. Inshore CPUE similar in 1998 and 1999. Both indexes increased in 2000.	Reflects an increase in the resource up to the mid 1990's, remaining at a high level since.	✚
Spatial pattern	Eastward expansion in effort by offshore vessels in early 1990's. Inshore effort widespread throughout the management area, especially in 2000.	Reflects widespread distribution and high density of shrimp over a large area.	✚
Temporal pattern	A winter-spring fishery for the offshore fleet and a spring - fall fishery for the inshore fleet.	High concentrations of shrimp available throughout the year.	✚
Male abundance	The 93 year class dominated the catches by the offshore fleet in 97 and 98, the 94 in 99 and the 95 in 2000. Higher proportion of males caught by inshore fleet than offshore.	Good recruitment of year classes produced in the early 90's resulted in high catch rates of males since 1995.	✚
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 offshore fleet). Narrow size distribution of females in 2000 samples.	Likely reflects a change in growth and size at sex change. Female component in 2000 comprised of fewer older ages (7+).	?
RESEARCH DATA			
Biomass/ abundance index	Biomass/abundance indices increased since 1997 and the lower 95% confidence intervals averaged about 446,000 tons/105 billion animals over the 1996 – 2000 period.	Biomass/abundance remains at a high level, possibly increasing since 1997.	✚
Spatial pattern	Widely distributed throughout the management area. Distribution patterns vary between years.	Broader distribution in the 1990's compared to the 1980's, because of higher stock size.	✚
Recruitment (male age structure)	The 1995 year class was weaker than the 1993 and 1994. The 1996 year class was the weakest observed. The 1997 & 1998 year classes are strong.	Biomass/abundance of males should be maintained in 2001/2002 due to the strong 1997 and 1998 year classes.	✚
Spawning stock (females)	The female stock index increased from an estimated 184,000 tons (22 billion animals) in 1997 to 302,000 tons (41 billion) in 2000. Narrow size distribution of females in 2000.	Spawning stock will likely decrease as weaker 1995 and 1996 year classes change sex and females are reduced through fishing and natural mortality.	?
OTHER FACTORS			
Predation	Abundance of known predators (e.g. cod, redfish, skate, American plaice) remains low in the offshore areas but abundance of young Greenland halibut is increasing.	Predation mortality assumed to be low relative to periods of high predator abundance.	✚
Environment	After 1995, temperatures have increased and this could impact growth, survival and sex change.	Uncertainty.	?
Industry perspectives	Offshore catch rates in Jan/Feb 2001 continue to be among the highest observed, but sizes again are reported to be small.	The resource is perceived to be healthy by both inshore and offshore sectors.	✚
ASSESSMENT			
Exploitation Rate	Ratios of nominal catch to survey biomass index (lower confidence intervals) were less than 12% since 1995.	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 components.**	✚
	Prospects: Expected decrease in female stock and fishing mortality on younger ages by inshore fleet create uncertainty.	?

Concerns for current status/future prospects −

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.

Catch	Increased from about 7500 tons during 1994 - 96 to 15,000 from 1997 - 00 in response to TAC increase. With few exceptions, TAC's were reached each year since 1986. Fisherman report an increasing number of catches that include *P. montagui* with *P. borealis*.
Effort	Increased during 1997 - 00 from the 1996 level with the increase in catches. Additional effort primarily due to existing offshore fleet. 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 the offshore fleet has been increasing since the early 1990's.	Reflects an increase in the resource over the past decade.	✚
Spatial pattern	The offshore component of the fishery expanded to shelf edge.	Reflects widespread distribution and high density of shrimp over a large area.	✚
Temporal pattern	Primarily a winter-spring fishery for the offshore fleet since 1995; previously a summer-fall fishery. Inshore vessels fish during summer-fall.	High concentrations of shrimp available throughout the year.	✚
Male abundance	Catch rates of males increased during most of the 1990's but decreased since 1998.	Good recruitment of year classes produced in the early 90's resulted in high CPUE for males. Weaker 95 and 96 year classes possibly caused decrease.	?
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 and the median size at sex change have declined since 1996 (data from offshore fleet). Narrow size distribution of females in 2000 samples.	Likely reflects a change in growth and size at sex change. Female component in 2000 comprised of fewer older ages (7+).	?
RESEARCH DATA			
Biomass/ abundance index	No complete survey in 2000		No Evaluation Possible
Spatial pattern			
Recruitment (male age structure)			
Spawning stock (females)			
OTHER FACTORS			
Predation	Abundance of known predators in the offshore areas such as cod, redfish, skate and American plaice remains low.	Predation mortality is assumed to be low relative to periods of high predator abundance.	✚
Environment	Positive correlation between ice cover and CPUEs six years later. Below normal ice coverage during the 1996 - 00 period.	Catch rates could decline gradually or remain stable over the next several years, assuming predator abundance remains low.	?
Industry perspectives	Catch rates from the 2001 fishery for Jan/Feb continue to be high.	Stock remains healthy.	✚
ASSESSMENT			
Exploitation Rate	No complete survey in 2000.	No inference for level of exploitation in 2000.	**None**

Stock Status		
	Current: Appears favourable from the fishery data but the lack of complete survey coverage creates uncertainty.	?
	Prospects: Lack of recruitment index (ages 1 & 2) does not allow projection.	?

Concerns for current status/future prospects −

Uncertainty regarding index quality or impact ?

Positive evaluation ✚

Lacking a survey, it is not possible to evaluate the impact of catches in 2000. Catches in previous years had no observable impact on the stock.

Catch	Increased from about 5200 tons during 1995 - 1997 to 8000 from 1998 to 2000 in response to TAC increase. TAC's, with few minor exceptions, have been reached each year since 1988. Sporadic *P. montagui* by-catch.
Effort	Increased from 1994 to 1996 and, except for 1997, has remained stable. Incidence of double trawling and use of windows are estimated to be 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
FISHERY DATA			
CPUE index	Fluctuated without trend up to 1997, stable thereafter.	Reflects relative stability in the resource.	✚
Spatial pattern	Increased effort south of 60^0 N from 1998 to 2000 due to partitioning of the quota.	Reflects the existence of high concentrations of shrimp along the shelf slope, outside the area fished during most of the 1990's.	✚
Temporal pattern	A summer-fall fishery. Ice covered in winter.	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 stable at a high level from 1997 - 2000.	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 1991. Narrow distribution of female sizes in 2000 compared to previous years.	Reasons for the decline are unclear, however, one factor may be the shift of effort to south of 60^0N. Females in 2000 comprised of fewer older ages.	?
RESEARCH DATA			
Biomass/ abundance index	No survey in 2000		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 for this area.	Cannot be evaluated.	**None**
Industry perspectives	Significant increases in catch rates over a wide area noted south of 60^0 N in 1999 and 2000.	Higher abundance in the area.	✚
ASSESSMENT			
Exploitation Rate	No survey in 2000.	No inference for level of exploitation in 2000.	**None**

Stock Status	**Current: Appears favourable from the fishery data but the lack of a research survey creates uncertainty.**	?
	Prospects: Lack of recruitment index (ages 1 & 2) does not allow projection.	?

Concerns for current status/future prospects −

Uncertainty regarding index quality or impact ?

Positive evaluation ✚

Lacking a survey, it is not possible to evaluate the impact of catches in 2000. Catches in previous years had no observable impact on the stock.

Catch	Increased from about 3200 tons in 1996 to 5300 from 1997 to 1999 in response to TAC increase. TAC's attained from 1995 - 1998. An exploratory fishery north of 63^0 N in 1999 (3500 ton quota) resulted in an additional catch of only 100 tons. Catch estimate for 2000 is preliminary. Fishery mixed with *P. montagui* in the southwest.
Effort	Increased from 1993 to 1995, stabilized thereafter or decreased slightly. "Target species" is, at times, uncertain. Double trawling since 1996 estimated at < 3% of total effort each year and use of windows is 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 from1993 to 1998 and declined in 1999 to the level observed in 1997. Increased again in 2000.	Increase associated with shift to southern area since 95. Mixed species fishery introduces uncertainty in CPUE as an indicator of long-term trend in stock size.	?
Spatial pattern	Effort shifted from north to south in the early 1990's. Southwest fished extensively since 1995, targeting dense concentrations of *P. montagui/borealis* east of Resolution Island.	Concentrations of *P. borealis* still exist in the northeastern area but were not sufficient to attract significant effort in recent years.	?
Temporal pattern	A summer-fall fishery. Ice covered in winter and spring.	Distribution unknown for much of the year.	?
Male abundance	Over the past four years, catch rates of males have been high and relatively stable.	Male abundance stable at a high level.	✚
Female abundance	Over the past four years, catch rates of females have been high and relatively stable.	Female abundance stable at a high level.	✚
Female stock characteristics	The mean size of females and median size at sex change declined since 1996. Narrow distribution of female sizes in 2000 compared to previous years	Population structure and boundaries uncertain. Fewer older females in the 2000 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.**	?
	Prospects: Unknown.	?

Concerns for current status/future prospects −

Uncertainty regarding index quality or impact ?

Positive evaluation ✚

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

SUMMARY OF ASSESSMENTS

	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	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**	**None**
Stock Status				
Current	✚	?	?	?
Prospects	?	?	?	?

Concerns for current status/future prospects ▬

Uncertainty regarding index quality or impact ?

Positive evaluation ✚