## 7.2 Invertebrate Fisheries

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### 7.2.1 Introduction

Discussion papers prepared for the Canadian Wildlife Service, the World Wildlife Fund and Habitat Management Division have dealt with commercially fished invertebrates to some extent, but have not been comprehensive. The report for Habitat Management Division lists the following species as significantly fished within the trough portion of the Gully (most since 1993): scallops, shrimp, stone crab, propeller and surf clam. The sizes of the fisheries are not given, and most of these fisheries are unlikely to occur within the trough which is >200 m in depth. Finfish diversity and taxa are identified from groundfish surveys, but not invertebrates. The WWF report (Shackell *et al.* 1996) suggests future fishery development could include resumption of a clam fishery, scallop fishery, and trap fisheries for lobsters and crabs within the Gully area but few details are given.

There are few active fisheries for invertebrates within the Gully (demarcated by 200 m contour) itself, but there is some potential for expansion of existing fisheries to this area, and for fisheries for new species. In addition there are some well developed fisheries on the adjacent Banks. Discussed below are (i) existing invertebrate fisheries relevant to the Gully area (ii) potential invertebrate fisheries, and (iii) some information gaps and possible sources of information.

#### 7.2.2. Existing Invertebrate Fisheries

Table 7.2.1 provides a summary, with some estimates of catches in the Gully area

<u>Scallops (*Placopecten magellanicus*)</u> - On the eastern Scotian Shelf, scallop beds are present on Sable Island Bank, and on Western, Middle and Banquereau Banks (Black *et al.* 1993) at depths <125 m. Most of the catch comes from Western Bank, more than 100 km from the Gully (Fig. 7.2.1). More information on scallop distribution closer to the Gully may be available from 1997 exploratory survey of the eastern Scotian Shelf funded by industry.

<u>Arctic Surfclam</u>, Northern Propellerclam and Ocean Quahog - These bivalves are found on sand or mud bottoms, usually in depths <100 m. Arctic Surfclam (*Mactromeris polynyma*) has been an important offshore fishery since about 1987 (Roddick 1996). The catch has been on Banquereau Bank, mainly east of Shortland Canyon. Propellerclam (*Cyrtodaria siliqua*) and ocean quahog (*Arctica islandica*) are permitted as a bycatch. Although generally not landed (Duggan 1996a, b), there is interest in developing markets for this species.

<u>Snow Crab (*Chionoecetes opilio*)</u> - Snow crab are fished commercially in deep areas (generally >120 m) on the eastern Scotian Shelf, where seasonal bottom temperatures are  $< 3 \,^{\circ}$ C (Tremblay 1997). The fishery has extended out as far as the Gully, but the distance from port makes this area of secondary importance. Snow crab have been captured in groundfish trawls near the Gully, and on Sable Island Bank; they were rarely captured west of 61 degrees longitude (Fig. 7.2.2).

<u>Shrimp (*Pandalus borealis*)</u> - Like snow crab, most of the shrimp fishing on the eastern Scotian Shelf occurs in deep holes (Canso, Misaine and Louisbourg) shoreward of the Gully, at depths >180 m. The bottom type is fine mud (La Have Clay) (Koeller 1996). Groundfish surveys indicate a fishable biomass of shrimp in the Gully and there is anecdotal evidence that shrimp are larger there.

<u>Lobster (*Homarus americanus*)</u> - There is no offshore fishery for lobster on the eastern Scotian Shelf. There is a fishery to the west, but existing participants have not extended their effort to the east (where catch rates are lower) (Fig. 7.2.3). Groundfish trawl surveys in the 1980s and exploratory fishing with traps indicates low concentrations of lobsters in the Gully area (Fig. 7.2.4). Some fishers believe there is a recruitment link between offshore lobster on the eastern Scotian Shelf and nearshore lobsters off eastern Nova Scotia, but there is no evidence to substantiate this. It is unlikely that any Gully lobsters would migrate inshore to the Chedabucto Bay area given the low bottom temperatures and rough terrain in the intervening area.

<u>Red Crab (*Chaceon quinquedens*)</u> - are fished mainly in depths of 300-900 m at temperatures of 5-8 °C (Duggan and Lawton 1997). The current fishery (5 vessels) fishes west of 61° longitude (Western Bank) (Fig. 7.2.5). Exploratory fishing suggests catch rates decrease to the east. Fishing with different gear types south of Emerald Bank captured over 400 crab, while in the Gully only 2 crab were taken (Halliday and Cooper 1991).

<u>Squid (Illex illecebrosus)</u> - have been highly abundant on the Scotian Shelf but not in recent years. In 1979 73,000 metric tonnes (mt) of squid were caught on the Scotian Shelf (Rowell *et al.* 1985). Catches declined in the 1980's and the fishery is now primarily a bycatch of the silver hake fishery. Squid prefer warmer waters (>6.0) and are distributed on the outer shelf and slope, in Emerald and La Have Basins and in the Gully. Concentrations were observed in the Gully between July and September of 1980- 1981 but not in 1982-83 (Rowell *et al.* 1985). More recent data should be available from groundfish surveys.

### 7.2.3 Developing or Potential Fisheries

<u>Stone Crab (*Lithodes maja*)</u> - have been found at temperatures of 1-5 °C and depths of 65-800 m (Squires 1990, Dooley and Johnson 1994, Woll 1996). This crab has been taken sporadically in other trap fisheries (snow crab, jonah crab) and as a bycatch in finfish operations. Exploratory trap fishing to date has generally yielded catch rates too low for commercial exploitation but trap design modifications could result in increases. The Gully area appears to have a relatively high concentration of stone crab, given the results of exploratory trap fishing (Perry and Smith 1969), and groundfish surveys. A related species (porcupine crab, *Neolithodes grimaldi*) is restricted to deeper waters, generally >300 m (Pohle *et al.* 1992).

<u>Other Crustaceans</u> - Several deep-water species are listed as having commercial potential by DFO (1991) and Pohle *et al.* (1992). In addition to stone crab, several deep water shrimp species are mentioned, as are two cephalopod species. Data on these species on the slope of the Scotian Shelf is virtually non-existent.

#### 7.2.4 Information Gaps

- Complete distribution data on red crab, stone crab, lobster, "other crustaceans"
  - the groundfish survey database has been accessed for some species but records for most invertebrates are not complete.
- Extent of movement between Gully and the rest of the Scotian Shelf (most species).
- Recruitment links between Gully and the rest of the Scotian Shelf (all species).
- Interactions between invertebrates and other species.

#### 7.2.5 Summary

- Existing commercial fisheries (clams, scallops, snow crab, shrimp) occur adjacent to the Gully trough (>200 m).
- In the future there is potential for expansion of existing fisheries to the Gully (*e.g.* snow crab, shrimp) as well as some new benthic fisheries (*e.g.* stone crab).
- There are no data that suggest the Gully is of special significance to the populations of any benthic invertebrate species that have commercial potential, but data on shelfwide distribution of most species is currently not available, and any recruitment links between the Gully and the rest of the Scotian Shelf are unknown.

#### 7.2.6 References

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Species	Fishery stage/ location	Catch rates - Gully area	Peak annual landings 1991-95 (from the Gully or Sable/ Banguereau)	Abundance index (from groundfish surveys, other)
Scallops Placopecten magellanicus	Developed - Western, Sable Island & Banquereau Banks, Middle Ground	Not expected in Gully, moderate on adjacent banks	482 mt (4000 mt round); most from Western Bank	NA
Arctic Surfclam Mactromeris polynyma	Developed - Banquereau Bank (<100 m), just N & E of Gully	Not expected in Gully, high on Banquereau	11,600 mt ; most from eastern Banquereau	NA
Propellerclam Cyrtodaria siliqua	Bycatch in surfclam fishery	Not expected in Gully, moderate on Banquereau	negligible	
Ocean Quahog Arctica islandica	Bycatch in surfclam fishery	Not expected in Gully, moderate on Banquereau	negligible	
Snow Crab Chinoecetes opilio	Developed - mainly shoreward of Gully but could expand	Moderate-high in northern trough	<30 mt	- abundant in and around Gully
Red Crab Chaceon quinquedens	Developing - Slope west of 61 deg long; could expand	Expected to be low in Gully	0	?
Squid Illex illecebrosus	Bycatch in offshore silver hake fishery	?	?	-abundant in the Gully in some summers
Lobster Homarus americanus	Offshore fishery developed to the west	Expected to be low in Gully	0	- present around Gully
Stone Crab Lithodes maja	Early development - Exploring E. Scotian Shelf including Gully	Moderate-high in Gully area	<3 mt (1997)	?
Shrimp Pandalus borealis	Developed - shoreward of Gully but could expand	?	negligible	- abundant in and around Gully
Other shrimp, decapod crustaceans	Potential fisheries	?	0	?

# Table 7.2.1. Invertebrates on the Eastern Scotian Shelf that are currently fished or that have fishery potential.



Fig. 7.2.1. Scallop fishing areas on the eastern Scotian Shelf adjacent to the Gully. From 1997 SSR by G. Robert, Invertebrate Fisheries Division, DFO.

Locations of snow crab occurrence during groundfish surveys, 1980-94. Sets were over entire Scotian Shelf. Total n of sets = 5801. N with snow crab = 96.



Fig. 7.2.2. Snow crab captured during Spring, 4VW Cod, Summer and Autumn groundfish surveys on the Scotian Shelf, 1980-1994. From Tremblay (1997).



Fig. 7.2.3. Offshore lobster fishing effort. Figure from 1997 SSR by D. Pezzack, Invertebrate Fisheries Division, DFO.



Fig. 7.2.4. Presence/absence of lobster in spring groundfish surveys during the 1980s. From 1997 SSR by D. Pezzack, Invertebrate Fisheries Division, DFO.



Fig. 7.2.5. Distribution of recent fishing effort for red crab. From 1997 SSR by P. Lawton and D. Duggan.