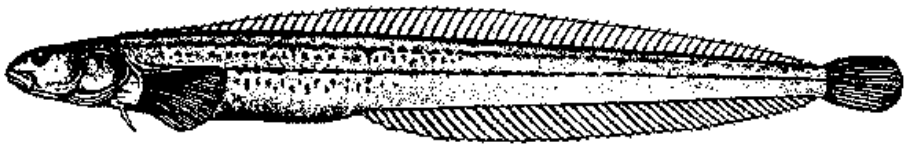
COSEWIC
Assessment and Update Status Report

on the

Pighead Prickleback
Acantholumpenus mackayi

in Canada



DATA DEFICIENT
2003

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC 2003. COSEWIC assessment and update status report on the pighead prickleback *Acantholumpenus mackayi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 21 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

Previous report:

Houston, J.J.P. and D.E. McAllister. 1989. COSEWIC status report on the blackline prickleback *Acantholumpenus mackayi* in Canada. Committee on the Status of Endangered Wildlife in Canada. 1-25 pp.

Production note:

1. COSEWIC acknowledges Alex E. Peden for writing the update status report on the pighead prickleback *Acantholumpenus mackayi* in Canada, prepared under contract with Environment Canada, overseen and edited by Mart Gross, the COSEWIC Marine Fish Species Specialist Co-chair.
2. Pighead prickleback *Acantholumpenus mackayi* was formerly assessed by COSEWIC as blackline prickleback *Acantholumpenus mackayi*.

For additional copies contact:

COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa, ON
K1A 0H3

Tel.: (819) 997-4991 / (819) 953-3215
Fax: (819) 994-3684
E-mail: COSEWIC/COSEPAC@ec.gc.ca
http://www.cosewic.gc.ca

Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur le terrassier à six lignes (*Acantholumpenus mackayi*) au Canada – Mise à jour.

Cover illustration:
Pighead prickleback — Courtesy of Natural Resources Canada.

Catalogue No. CW69-14/356-2004E-PDF
ISBN 0-662-36320-5
HTML: CW69-14/356-2004E-HTML
0-662-36321-3

Recycled paper

COSEWIC
Assessment Summary

Assessment Summary – May 2003

Common name
Pighead prickleback

Scientific name
Acantholumpenus mackayi

Status
Data Deficient

Reason for designation
There are insufficient data on population size and distribution.

Occurrence
Arctic Ocean

Status history
Designated Special Concern in April 1989. Status re-examined in May 2003 and designated Data Deficient. Last assessment based on an update status report.

COSEWIC
Executive Summary

Pighead Prickleback
Acantholumpenus mackayi

Houston (1988) provided the first report of pighead pricklebacks, *Acantholumpenus mackayi*, for COSEWIC. In April 1989, COSEWIC designated the pighead prickleback as Special Concern. This report is an update that includes findings of Bond, Hopky, Lacho, Ratynski and others (see references) as well as the author's own observations.

Species Information

This marine fish is a member of the family Stichaeidae. It has a slender, eel-like body with numerous dorsal rays extending along the full length of its back. It is distinguished from other stichaeids by thickened lips, stout head, and proportionally smaller eyes. Although the proper common name for this prickleback is the pighead (American Fisheries Society), this species is sometimes called the blackline prickleback.

Distribution

Pighead pricklebacks are known from three areas: 1) Sea of Okhotsk and Sea of Japan; 2) Bering Sea; and 3) Canadian Beaufort Sea. The Beaufort Sea population may extend from Phillips Bay, Yukon to Tuktoyaktuk Harbour and Liverpool Bay, Northwest Territory.

Habitat

Larvae are planktonic and disperse in ocean currents. Juveniles and adults occupy sand, silt or mud bottoms. They are found mostly in shallow, saline areas in or below the halocline, although adults and larvae can tolerate diluted seawater above the halocline. They are also found in brackish waters of lakes and river mouths as well as more saline waters. They occur as deep as 56 m in Bristol Bay (Bering Sea) and as deep as 26 m depths in Tuktoyaktuk Harbour. Their distribution probably changes with seasonal and daily shifts of the thermocline and halocline.

Biology

The pighead prickleback feeds on benthic invertebrates. At Tuktoyaktuk, the maximum known age is 16 years, and adults mature at 4 to 5 years. Males are generally larger than females, reaching lengths close to 50 mm compared to 47 mm for

females. Although very little is known about their physiology, they survive long periods under ice and in darkness.

Population Sizes and Trends

The abundance of pighead pricklebacks in Canada is poorly known. A single population estimate for Tuktoyaktuk Harbour suggests 2100 individuals of which 1600 may be mature fish. Populations likely have dominance of a few age classes. No trend data exist.

Limiting Factors and Threats

Little is known about the limiting factors and threats to this species. There may be gaps in recruitment strength, and strong age classes may be necessary to offset periods of poor year-class survival. Their distribution may be clumped and thus susceptible to local perturbation, including the potential long-term effects of global warming and increased freshwater flows into their saline habitats. The oil industry may impact the species as leakage sinks into saline bottom-water.

Special Significance of the Species

The Canadian population is unique in that it represents the most eastern occurrence of the species. It also appears to be isolated from the Bering Sea populations. The species does not have direct economic value, but does have ecological roles as a consumer of bottom organisms and as likely prey for seabirds, whales, seals and predatory fish.

Existing Protection

Canadian and territorial statutes regulate habitat/environmental standards in areas where the species lives. The COSEWIC designation of “special concern” in 1989 raised its profile in habitat and environmental assessments. The federal Fisheries acts alleviate some threats, especially pollutants in harbours such as Tuktoyaktuk where authorities can respond to spillage of contaminants on ocean bottoms. There is no direct concern expressed for pighead pricklebacks by the Northwest Territories government (2002).

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species and include the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS (AFTER MAY 2003)

Species	Any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

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Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
COSEWIC Status Report

on the

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in Canada

2003

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SPECIES INFORMATION

Name and classification

Family:	= Stichaeidae (pricklebacks)
Subfamily:	= Lumpeninae
Genus:	= *Acantholumpenus*
Species:	= *mackayi*
English common name:	= Pighead Prickleback
Synonym:	= Blackline Prickleback
French common name:	= terrassier à six lignes
Inuit name	= none (McAllister 1987)

Description and taxonomy

As a member of the family Stichaeidae, pighead pricklebacks have a slender eel-like (anguilliform) body and a long dorsal fin consisting of spinous rays that extend behind the head to the base of the tail (Fig.1). Their abdominal vertebrae do not have haemal arches unlike similar-looking gunnels (family Pholidae). Baxter (1988ms) and Wilimovsky (1958) assigned Alaskan pighead pricklebacks to the genus *Lumpenus* and identified it by: 1) the gill membranes extending well forward on the gill isthmus without forming a free fold or being broadly fused to the gill isthmus; 2) the lateral line absent or rudimentary; 3) presence of two spinous anal fin rays; 4) more than 67 spinous dorsal rays; 5) shorter snout; 6) tips of dorsal spines not free of fin membranes; and 7) lower pectoral fin rays shorter than middle rays. Morphologically, pighead pricklebacks can be distinguished from their closest related congener, *Lumpenus,* by thickened lips, a stout head and proportionally smaller eyes having a less distinct border (Fig. 2). Their lips (especially maxilla) are considerably deeper in large fish (Fig 2). When their mouth is completely closed, the lower jaw fits inside the maxillary and pre-maxillary bones, causing a ventral orientation to the mouth expected on bottom living fish.

DISTRIBUTION

Pighead pricklebacks are known from three areas (Fig. 3): (1) In the Sea of Okhotsk area, they are recorded near Hokkaido, Peter the Great Bay (Schmidt 1950). (2) In the Bering Sea area, populations are found in Bristol Bay (Evermann and Goldsborough 1907) and near Adak Island, Chukchi Sea, Kvichak, Bay, Norton Sound and between Nome and Safety Sound. A single specimen is recorded from Yakutat, Gulf of Alaska (Mecklenburg 1994ms; 2002). (3) The Beaufort region comprises the Canadian distribution, with populations known to exist from west of the Mackenzie River Delta at Phillips Bay in the Yukon Territory, and east near the Beaufort Sea, namely Kugmallit Bay, Tuktoyaktuk Harbour, Hutchison Bay, and Liverpool Bay including Wood Bay (Figs. 4, 5 & 6, also see Collections Examined).

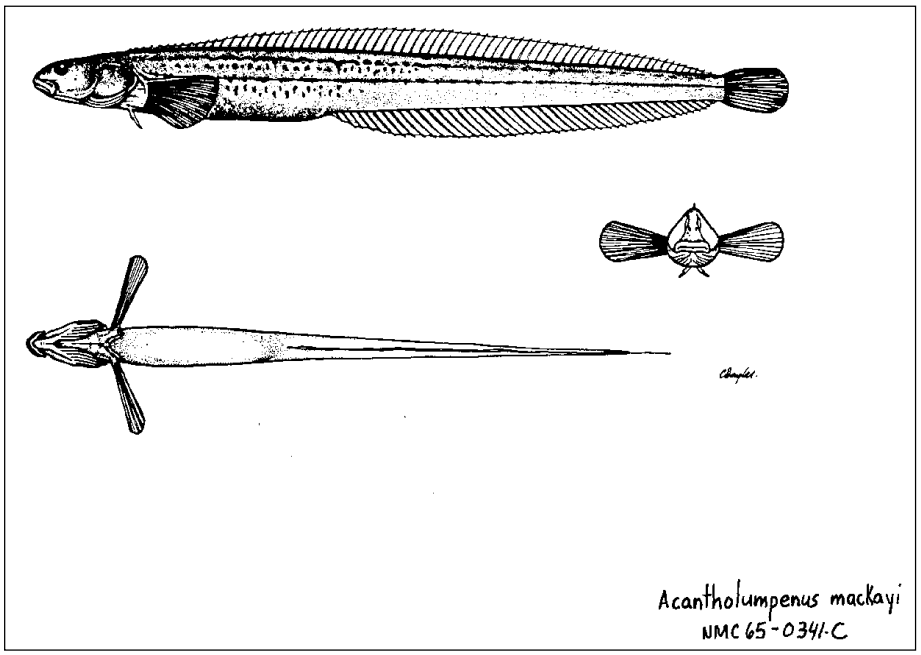

Figure 1. Illustration of *Acantholumpenus mackayi* (from Environment Canada, “Species at Risk” web page 2002).

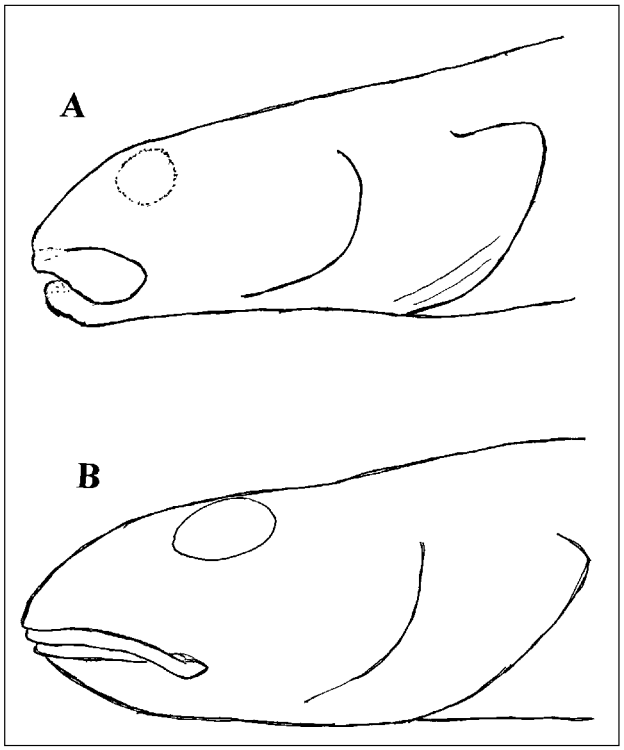

Figure 2. Diagrammatic comparison of head and mouth structure in larger specimens of *Lumpenus*-like fishes: A) 288 mm specimen of *Acantholumpenus mackayi* (Royal BC Museum specimen) from Bering Sea, with much thicker maxilla, blunter head, and smaller eye having an indistinct border; B) similar view of 297 mm *Lumpenus sagitta* (Royal BC Museum 974-448) with narrower lips, proportionally larger eye with distinct borders and more elongate snout.

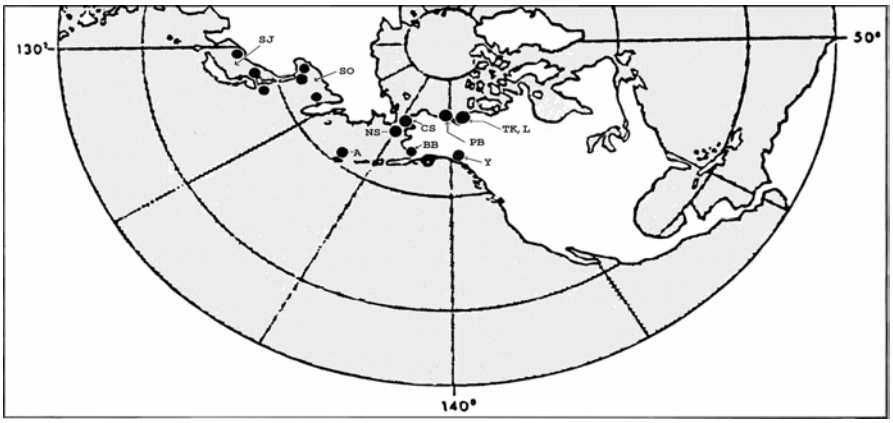

Figure 3. Map showing global distributions of *Acantholumpenus mackayi* between Beaufort, Bering, Okhotsk and Japan seas: “A” refers to Adak Island; “BB” = Bristol Bay, Alaska; “CS” = Chukchi Seas;”NS” = Norton Sound, Alaska; “PB” = Phillips Bay, Yukon; “SO” = Sea of Okhotsk; “SJ” = Sea of Japan; “TK, L” = Tuktoyaktuk and Liverpool Bay, NWT; “Y” = Yakutat, Alaska. See Mecklenburg (2002) for details on Distributions.

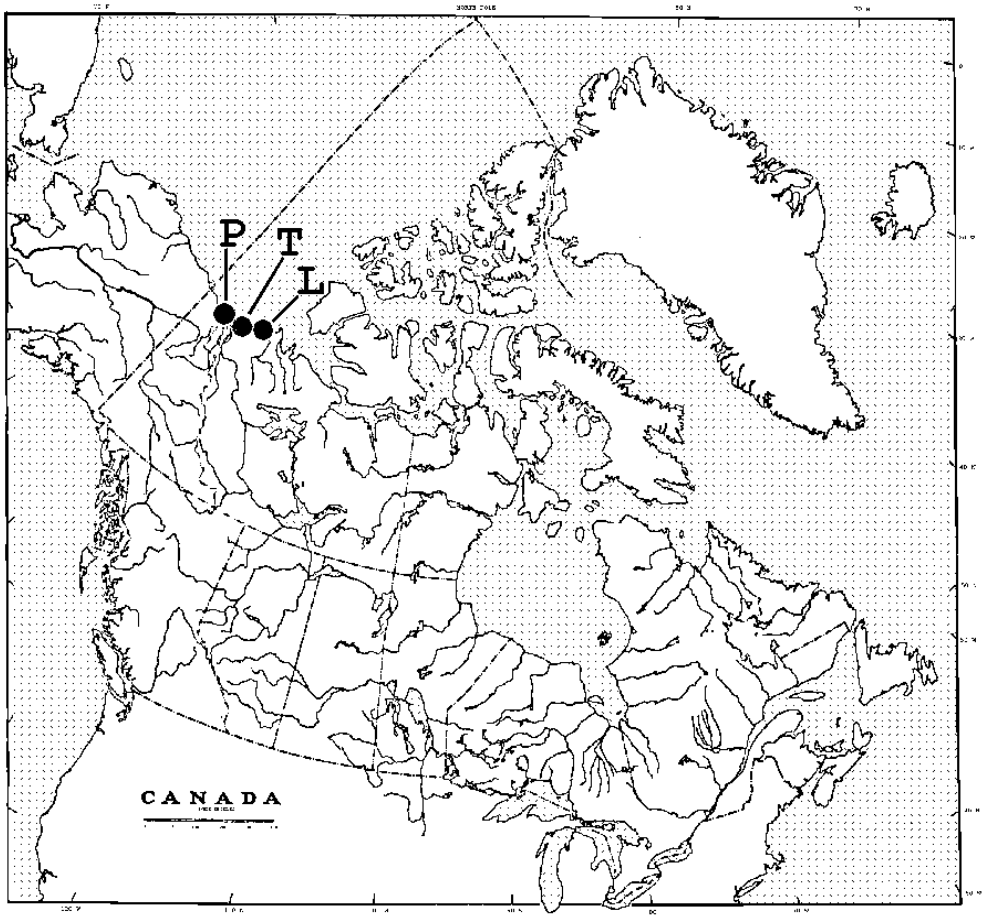

Figure 4. Map showing Canadian distributions (see black dots, upper left): "P" indicates Phillips Bay (Yukon), "T" = Tuktoyaktuk, Tuktoyaktuk Harbour and Kugmallit bay (NWT) areas, "L" = Liverpool Bay (including Wood Bay, NWT). Distributions adapted from Species at Risk (see Environment Canada 2002) and known museum records (Collections examined & Table 1).

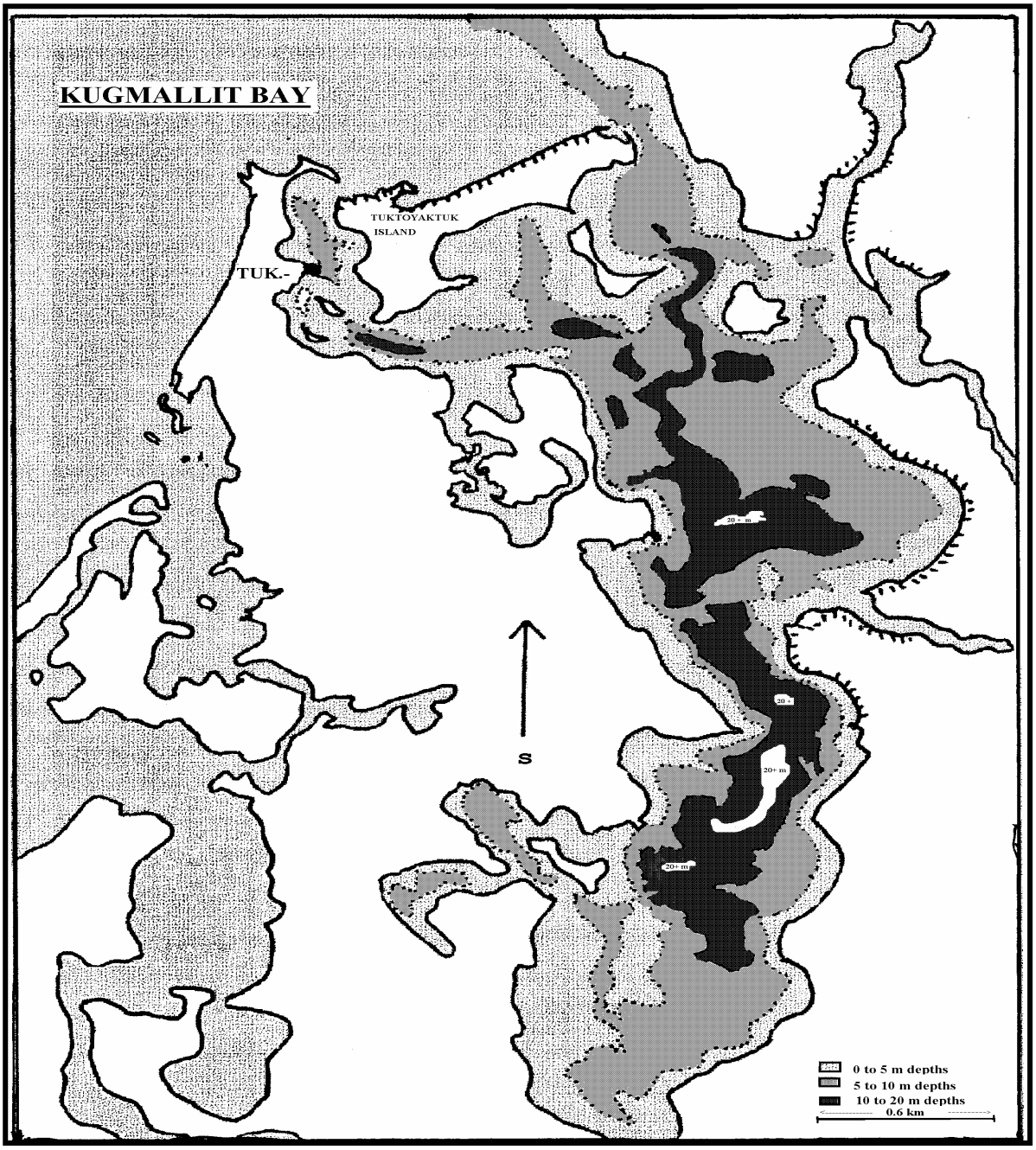

Figure 5. Depth contours in Tuktoyaktuk Harbour showing protected deeper habitat, where seawater is presumably trapped during spring flood of the Mackenzie River where pighead pricklebacks can presumably find refuge (see Hopky and Ratynski 1983). Light shaded portions indicate depths of 0 to 5 m; moderate shading, 5 to 10 m, dark shading, 10 to 20 m. White areas enclosed by dark shading range between 20 and 26 m. Map redrawn from Canadian Hydrographic Service (2002 - map # 7685).

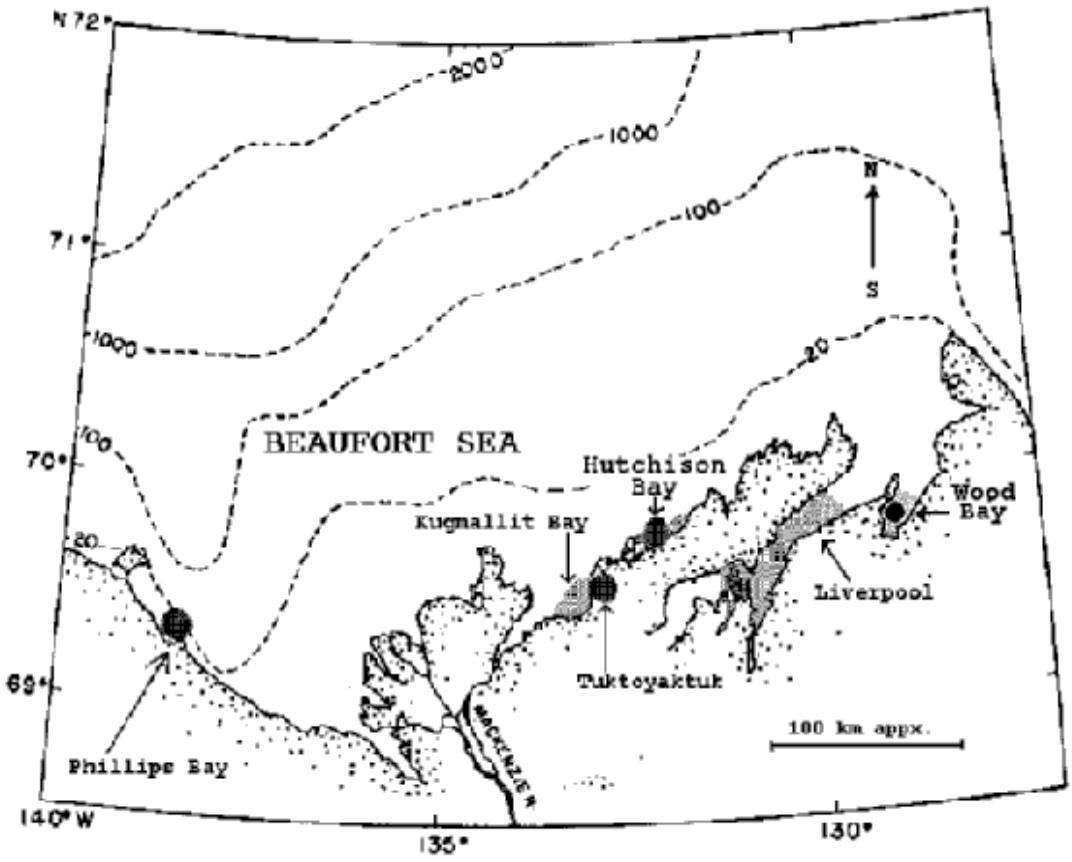

Figure 6. Canadian distribution of pighead prickleback (*Acantholumpenus mackayi*) off the Mackenzie River estuary (Yukon and Northwest Territories). Map is adapted from Macdonald and Carmack (1991) and shows depth contours of the Beaufort Sea in meters. Shaded areas near Hutchison Bay, Kugmallit Bay, Liverpool Bay, Wood Bay and Tuktoyaktuk Harbour indicate known Canadian species distribution.

Canadian range

The spotty distribution of pigheads found in Canada may reflect habitat requirements, or may be due to incomplete sampling; pighead pricklebacks are not usually the focus of Arctic fishery research and inventory. In Liverpool Bay, Bond and Erickson (1992) found great variation in numbers between sites, suggesting habitat limitations.

HABITAT

Habitat requirements

Pighead pricklebacks are found at various depths and salinities. In Japanese waters, they are found in coastal lakes and shallower seas near estuaries although they have also been recorded at a 60-70m depth in the ocean (collection NMC 84-0232 –

Table 1); in Alaskan waters, they are found at the mouth of Egegik River (Bristol Bay, Bering Sea), as well as in the ocean near Adak (Aleutian Islands) and at depths of up to 56 m in Bristol Bay (Mecklenburg 1994ms, 2002).

Table 1. Seasonal distribution of capture for museum collections.

	June		July				August				Sept
Location	**14 - 21**	**21 - 30**	**1 - 7**	**8 - 14**	**15 - 21**	**21 – 30**	**1 - 7**	**8 - 14**	**15 - 21**	**21 - 31**	**1 - 7**
Phillips Bay	-	-	-	1	-	-	-	-	-	-	-
Kugmallit Bay	-	-	-	1	1	-	-	1	1	-	1
Tuk. Harbour	2	-	-	11	-	-	-	-	23	-	-
Hutchison Bay	-	-	-	-	-	-	-	1	-	-	-
Liverpool Bay	-	-	-	-	-	5	7	272	6	1	4
TOTAL	2	0	0	12	1	5	7	272	30	1	4

In Canada, most information about pighead pricklebacks is known from Tuktoyaktuk Harbour (located in Kugmallit Bay, Beaufort Sea, east of the Mackenzie Delta). The maximum depth of capture in this location was 26 m (Hopky and Ratynski 1983). They are mostly known in or below the halocline, in areas where salinity gradients range from 1‰ (parts per thousand) above to 30‰ below the halocline during winter, and 12‰ above to 27.5‰ below the halocline in summer (Galbraith and Hunter 1976; Hopky and Ratynski 1983). Inshore salinity increases in late summer to early spring, allowing increased access of pricklebacks into shallower waters. Tidal amplitudes are insignificant here compared to most Canadian marine waters. Winter temperatures range between 0°C under ice cover and 0.5°C on the bottom of the harbour. In summer, temperatures can be 15°C on the surface and 0°C on the bottom.

New ice usually forms in October with relatively smooth landfast ice occupying the inshore region over the 20-m isobath, some of the ice remaining in place throughout winter (McDonald et al. 1995). Nearshore waters less than 2 m freeze to the bottom. Depending on ice thickness, the oceanic halocline is variably restricted by narrowed shallow entrances to Tuktoyaktuk Harbour. During spring, dilute waters of the Mackenzie pass through these entrances, replacing surface layers, likely causing pighead pricklebacks to seek deeper habitat within the harbour. Other known populations have free access to oceanic habitats [see charts 7608, 7661, 7662, 7663, 7664, 7685 Canadian Hydrographic Service (2001)]. Most inshore water is <10 m for 6 to 15 nautical miles off the Mackenzie delta; however, no pighead pricklebacks are known between Kugmallit Bay off the eastern Mackenzie Delta to Phillips Bay, Yukon Territory.

Habitat trends

There are no data on habitat trends.

Habitat protection/ownership

The gederal government controls much of the Beaufort sea-bottom where pighead pricklebacks occur. Federal and territorial authorities are responsible to manage fisheries and ensure environmentally safe water standards. Surface and subsurface resources in Tuktoyaktuk and Hutchison harbours are owned and controlled by the Inuvialuit people. In Liverpool Bay, the Inuvialuit control surface resources, but not subsurface oil or mining resources (Indian and Northern Affairs Canada, 2002). Accordingly, protection of habitats occupied by pighead pricklebacks requires cooperation among all interested parties.

BIOLOGY

General

The pighead prickleback is a marine fish tolerating estuarine habitat. Their young probably spend early life drifting in midwater as planktonic larvae before settling on the bottom to feed on benthic invertebrates (Ratinsky 1983). The species is adapted to cold saline waters below sea ice in winter, and is adapted to living near estuarine and marine water in or below the holocline. The degree of their tolerance to intrusions of fresh and dilute waters is unknown.

Males outlive and outgrow females: males reach approximately 500 mm in length, and live up to 16 years of age, while females reach 470 mm in length and live up to 14 years. In Tuktoyaktuk Harbour newly hatched larvae and juveniles range between 15.8 and 21.5 mm in length (Ratynski 1983).

Reproduction

It is stated that pighead pricklebacks “seek” cooler and saltier water to breed (Species at Risk May 16, 2002). On the other hand, pighead pricklebacks at Tuktoyaktuk probably spawn during fall or winter when temperatures are already cold, holocline definitely shallower, and near surface waters more saline than in spring and summer when the Mackenzie River floods. Whether pricklebacks actively seek cooler and saltier water requires proof.

The average age of reproduction for pighead pricklebacks is approximately 9.5 years for males and females (calculation extrapolated from Hopky and Ratynski 1983). Females were found in August to have ova ranging from 1.0 to 1.4 mm in diameter (McAllister 1975); and by September to have nearly ripe ova (Ratynski 1983).

Year-to-year variation in year class strength (Hopky and Ratynski 1983) will affect population size and recruitment. A collection in 1981 in Tuktoyaktuk Harbour showed dominant age classes of 3, 6, and 13 years.

Table 2. Length distributions, by sex, of various age groups of *Acantholumpenus mackayi* subsampled from 1981 Tuktoyaktuk Harbour catches (Hopky and Ratynski 1983).

	Age (years)																													
	2	3	4			6		7	9	10		11	12	13		14		15	16
	U	U	U	M	F	M	F	M	F	M	F	F	M	M	F	M	F	M	M
Length (mm)																			
0-25																			
26-50																			
51-75																			
76-100	2																		
101-125	1	3																	
126-150		7																	
151-175		4																	
176-200		2	1																
201-125			1																
226-250			1		1		2												
251-275				1		1	4								1				
276-300							9												
301-325						4	2		1										
326-350						5		1			1				2				
351-375						3									1		3		
376-400						1		1		1				1	4		1		
401-425												2			1				
426-450										2				2	1	1			
451-475													1	6	1	1		1	
476-500													1	2		1			1

Survival

Nothing is known about limiting factors to survival.

Physiology

Nothing is known about their particular physiology; however, they are assumed to possess physiological adaptations to withstand cold-water temperatures and survive long periods under ice in winter darkness. Their presence near estuarine conditions suggests that they possess an ability to adjust to salinity changes; however, their general distribution and circumstances of capture suggest that they are not adapted to conditions of pure freshwater.

Movements/dispersal

They probably disperse in response to underwater changes of salinity, turbidity, temperature gradients, summer-light and winter-darkness as they shift between shallower and deeper depths. Schetninnikov (1983) and Houston (1988) characterize the pighead prickleback as a non-schooling species. Doug Chiperzak (pers. comm. Dec 10, 2001) suggests that movements may be part of a migration between deeper and shallower waters.

Nutrition and interspecific interactions

Lacho (1991) found the following in stomachs of pighead pricklebacks (in descending order of occurrence):

unknown digested remains	= 64;	pelecipods	= 6;
polychaetes	= 47;	nematods	= 5;
oligochaetes	= 35;	gastropods	= 3;
amphipods	= 24;	bryozoans	= 3;
copepods	= 9;	mycideans	= 2;
plant remains	= 8;	foraminiferans	= 1

Many anadromous and estuarine fishes are found in the shallow waters where pighead pricklebacks migrate; marine fishes occupying the bottom habitat where the pighead prickleback primarily lives includes:

saffron cod - *Eleginus gracilis*
Arctic cod - *Boreogadus saida*
Fourhorn sculpin - *Myoxocephalus quadricornis*
Arctic flounder - *Liopsetta glacialis*;
starry flounder - *Platichthys stellatus*;
slender eelblenny - *Lumpenus fabricius*.

All tolerate estuarine conditions; however, the latter four are more often associated with bottom habitats. Presumably they all seek the more saline portions of estuaries, especially in and below the halocline.

Behaviour/adaptability

Other than clumped aggregations and movements over soft sedimented bottoms, there is little information on pighead behaviour. Large pighead pricklebacks have approportionally stout head with high snout and larger lips that suggest special behaviours used for reproduction, foraging or competition. Their eyes appear quite conspicuous and large and this may assist them in subdued light below the holocline during times when surface waters are iced over or clouded with river silt. In contrast, specialized species of pricklebacks adapted to living in the intertidal zone or amongst subtidal rocks have body forms suggesting that they are stronger swimmers (e.g., *Lumpenus sagitta*; Peden pers. observ. — also see species accounts in Hart 1973 and Mecklenburg 2002).

POPULATION SIZES AND TRENDS

In Canada, pighead pricklebacks appear to be more abundant during the months of August and September, after floodwaters subside and the mixing of saline and river waters produces elevated levels of salinity (Bond and Erickson 1989a, 1991, 1992, 1993; Hopky and Ratynski 1983; and Ratynski 1983). Numerous surveys have been undertaken in the Beaufort Sea area (e.g., Galbraith 1975; Galbraith and Hunter 1976); however, very few pighead prickleback were caught. Sampling by the private sector has not yielded specimens (Millman 2003, pers. comm.; Chiperzack 2003, pers.comm.). The limited sightings and their presence in apparently only a few localities make it difficult to obtain data on population structure. This, along with ill-defined population boundaries, produces considerable margins of error when estimating population sizes. The population in Tuktoyaktuk Harbour is the best known due to their confinement in an enclosed harbour basin (Hopky and Ratynski 1983).

Among the 15 fish species captured in Tuktoyaktuk Harbour from otter trawls, pighead pricklebacks ranked 5th in abundance with 177 being captured (Hopky and Ratynski 1983); however, these captures are only from two trawled stations and not necessarily representative of the entire harbour. In Wood Bay, pighead pricklebacks were caught in fewer numbers through use of stationary gillnets and trapnets at four stations (Bond and Erickson 1989, 1990, 1991). In Wood Bay, they were found to be 12th in abundance of 23 fish species captured. Finally, in Phillips Bay, Yukon Territory, only 2 specimens have been captured and no ranking is possible (Bond and Erickson 1989).

In Tuktoyaktuk Harbour, a rough estimate of population density (below the 7 m depth contour) is about 29 individuals per km^2 (Hopky and Ratynski 1983). The population size of trawlable pighead pricklebacks within this area is 2,160 with approximately 1,600 of these being mature fish. Because the smallest fish within the population undoubtedly slip through the mesh netting, actual total population size may be higher than the 2,160 estimate. If similar densities were found throughout the harbour, pighead numbers could reach some 16,000. Factors impairing accurate

estimates include variation in bottom topography, salinity, and temperature preferences causing clumped aggregations within and outside the areas sampled. Population densities of 500 to 720 per km^2 are reported in Asiatic waters (Schetninnikov 1983; Houston 1988).

The distribution of pighead pricklebacks is clumped, with aggregations shifting location in response to seasonal and day-to-day environmental changes. For example, changes in salinity and temperature during early summer may cause populations of pigheads near the Mackenzie estuary to aggregate in deeper areas and therefore avoid fresh surface waters above the halocline. Populations in Wood Bay (Anderson River estuary) have very free access to deep water at all times (Bond and Erickson 1991, 1992; Hopky and Ratynski 1983). Summer capture rates at Wood Bay varied from 4 at one site to 1749 at another in 1990. Daily samples varied between 901, 317, 130 and 3 at one site, whereas the combined total was 401 for the remaining 52 days of sampling (none were caught on 13 days).

The whereabouts of pighead pricklebacks elsewhere in the world are speculative and numbers too variable to provide accurate population estimates.

LIMITING FACTORS AND THREATS

Pighead pricklebacks may be especially vulnerable to artificial dredging of basins used to accommodate ships, and to oilrigs or pipelines carrying oil to ships from offshore oil wells if there is spillage of contaminants. Freshwater flooding in spring, or by human diversion of rivers, could be a threat to their habitat as pighead pricklebacks require access to salinity. In Tuktoyaktuk Harbour, pigheads are taken almost exclusively in otter trawls towed in deeper saline water; salinities may be near 0.5‰ at 0 to 6 m depths but 25 to 30‰ at the 10 to 20 m depths where they are captured (Hopky and Ratynski 1983). Fishing may also impact populations; Doug Chiperzak (pers. comm. Dec. 10, 2001) noted a gill net-caught specimen taken by a local fisherman in very shallow water in Tuktoyaktuk Harbour.

Long-term habitat issues of global warming (i.e., loss of nearby permafrost ice within pingos and beneath tundra eroding shorelines) and potential accidents of the oil industry (heavier oils sinking to becoming trapped in deeper basins) suggest potential vulnerability for localized pighead populations.

SPECIAL SIGNIFICANCE OF THE SPECIES

The Canadian population of pighead pricklebacks represents the easternmost known occurrence of the species. The Canadian population may also be isolated from the populations known in the Bering Sea. There is little movement of water from the Bering Sea as far as the Mackenzie estuary due to the complex current patterns off the Mackenzie and Yukon rivers (Macdonald et al. 1989). This may result in restricted or little gene flow from the closest known Alaskan population in the Chukchi Sea (1200 km west of Philips Bay, Yukon Coast). This potential isolation of the Canadian population requires further clarification.

Pighead pricklebacks are consumers of bottom invertebrates and contribute to the local ecological food chain. They were ranked 5th in abundance among the fish species caught at Tuktoyaktuk Harbor suggesting that they may be significant contributors to the food web.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

There are no specific regulations protecting pighead pricklebacks, although Canadian and territorial statutes regulate habitat and environmental standards in which this fish lives. Originally designated as “vulnerable” by Houston (1988), the species was designated to be of “special concern” by COSEWIC in April 1989 due to its limited distribution and low numbers. This raises the need to consider the species in assessments of habitat and environmental standards. Being an estuarine/marine species, federal Fisheries acts alleviate threats such as potential environmental contamination within enclosed harbours such as Tuktoyaktuk. There is no direct concern for pighead pricklebacks expressed by the Northwest Territories government (2002). However, a new NWT-Wildlife Management Board may find information that raises concern in Aboriginal Traditional Knowledge (Bell 2001, pers. comm.).

SUMMARY OF THE STATUS REPORT

Globally, pighead pricklebacks are known in three areas: 1) Sea of Okhotsk and Sea of Japan; 2) Bering Sea, Aleutian Islands and Gulf of Alaska; and 3) the Beaufort Sea of Canada. Estimates of trends for the Canadian population are not available. The most relevant sampling is in Tuktoyaktuk Harbour. Here, population numbers are suggested to be 2,160 fish, but could reach 16,000 depending on the evenness of distribution and the extent of occurrence within the sampling sites. Potentially localized distribution, isolation from non-Canadian populations, dredging of harbours, long-term habitat issues of global warming (i.e., loss of nearby permafrost ice within pingos and beneath tundra eroding shorelines), potential accidents of the oil industry, together suggest potential vulnerability for pighead populations; however, appropriate data are still lacking.

TECHNICAL SUMMARY

Acantholumpenus mackayi (Gilbert)
Pighead Prickleback Terrassier à six lignes

Extent and Area information	
• *extent of occurrence (EO)(km²)*	Possible maximum of 10,000 km^2
• *specify trend (decline, stable, increasing, unknown)*	Unknown
• *are there extreme fluctuations in EO (> 1 order of magnitude)?*	Unknown
• *area of occupancy (AO) (km²)*	Total, probably much less than 10,000 km^2. Tuktoyaktuk = approximately 29 km^2; Liverpool Bay > 200 km^2
• *specify trend (decline, stable, increasing, unknown)*	Unknown
• *are there extreme fluctuations in AO (> 1 order magnitude)?*	Possible seasonal shifts of occurrence, otherwise unknown
• *number of extant locations*	About 5 or 6 known in Canada.
• *specify trend in # locations (decline, stable, increasing, unknown)*	Unknown.
• *are there extreme fluctuations in # locations (>1 order of magnitude)?*	Unknown.
• *habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat*	Unknown.
Population information	
• *generation time (average age of parents in the population) (indicate years, months, days, etc.)*	Roughly 9 to 10 years (mean reproductive age varies with sizes of dominant year classes).
• *number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	Based on data for one year, mature, trawlable fish: Tuktoyaktuk: 1600+
• *total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	Unknown.
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	NA
• *are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?*	Yes, year classes fluctuate.
• *is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?*	3 sampled populations in Canada, with unknown boundaries; globally, well fragmented.
• *list each population and the number of mature individuals in each*	Tuktoyaktuk (1600+); Liverpool Bay (?); Phillips Bay (?)
• *specify trend in number of populations (decline, stable, increasing, unknown)*	Unknown
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	Unknown
Threats (actual or imminent threats to populations or habitats)	
- potential threats include oil exploitation, global warming, dredging of harbours	

Rescue Effect (immigration from an outside source)	
• *does species exist elsewhere (in Canada or outside)?*	Known outside Canada in western Alaska and near Japan.
• *status of the outside population(s)?*	Unknown.
• *is immigration known or possible?*	Restricted.
• *would immigrants be adapted to survive here?*	Unknown.
• *is there sufficient habitat for immigrants here?*	Unknown.
Quantitative Analysis	

Other Status **COSEWIC: Special Concern - 1989**

Status: DATA DEFICIENT **Criteria met: N/A**
Reasons for Designation: There are insufficient data on population size and distribution
Applicability of Criteria **Criterion A** (Declining Total Population): Not applicable; population declined catastrophically 100 years ago, but began increasing about 50 years (2 generations ago). **Criterion B** (Small Distribution, and Decline or Fluctuation): Not applicable; there is a small distribution in terms of breeding sites, but population is now increasing after catastrophic decline 100 years ago. **Criterion C** (Small Total Population Size and Decline): Not applicable; population did decline to very few individuals 50 – 100 years ago, but is now increasing. **Criterion D** (Very Small Population or Restricted Distribution): Meets D1 and D2 criteria for Threatened (less than 1000 breeding individuals at less than 5 sites) **Criterion E** (Quantitative Analysis): None done.

ACKNOWLEDGEMENTS

Raymond Ratynski of the Freshwater Institute, Fisheries and Oceans Canada, provided reprints and valuable information by phone and regular email. Doug Chiperzak, Head, BSIMPI Secretariat, Oceans Program in Yellowknife, and Glen Hopky, Department of Fisheries and Oceans, quickly responded to email requests regarding the pighead prickleback records. Dr. D.J. Macdonald of the Institute of Ocean Sciences, Sidney, BC, provided a list of his publications on the inshore physical environment in the Mackenzie Delta region of the Beaufort Sea. Claude Renaude, Canadian Museum Nature, facilitated the writer's request to view all specimens of *Acantholumpenus* at the Canadian Museum of Nature. Eric Taylor and Don McPhail provided access for the writer to view collections at the University of British Columbia. Kelly Sendall of the Royal BC Museum provided access and facilities to view specimens. Margaret Treble, Arctic Stock Assessment Biologist, DFO, provided a useful review. Mart Gross and his research assistant Jessica da Silva at the University of Toronto provided helpful suggestions as well as extensive editing of this report.

Funding for the preparation of this status report was provided by the Canadian Wildlife Service, Environment Canada.

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BIOGRAPHICAL SUMMARY OF THE REPORT WRITER

Alex E. Peden received his master's degree from the University of British Columbia in 1964 and doctorate at the University of Texas at Austin in 1970. After receiving a postdoctoral appointment at the National Museum of Canada, he was appointed Curator of Marine Biology at the British Columbia Provincial Museum in 1971. He participated in ichthyological collection and/or fisheries work in southeastern USA, Mexico, Northwest Territories, Alaska, Bering Sea and waters adjacent to British Columbia. During his first employment with the Arctic Unit of the Fisheries Research Board of Canada, Peden had the good fortune to experience gill netting and the local fishery during a summer off the Mackenzie Delta. He devoted much of his career to documenting the diversity of fish species off the Canadian West Coast. Peden documented the first occurrences of more than 60 marine fish species inhabiting marine waters off British Columbia. He has contributed to various COSEWIC status reports of western Canadian fish species since 1980.

AUTHORITIES CONSULTED

Most of the fisheries literature used for this report was kindly provided by Raymond Ratynski who had first-hand experience with *Acantholumpenus* in the Tuktoyaktuk area and now serves as Species at Risk Coordinator, Central & Arctic Region, Freshwater Institute, Fisheries and Oceans Canada. Doug Chperzak, Head, BSIMPI Secretariat, Oceans Program in Yellowknife, provided valuable comment on Liverpool Bay and Tuktoyaktuk samples. Glen Hopky of Department of Fisheries and Oceans quickly responded to email requests regarding the lack of *Acantholumpenus* records from the bottom of the Beaufort Sea. Robert Bell was contacted regarding Aboriginal Traditional Knowledge through the NWT Wildlife Management Board. D.J. Macdonald of the Institute of Ocean Sciences, Sidney, BC, contributed numerous articles on the physical, inshore oceanic environment off the Mackenzie River Delta. Peter Millman, Environmental Planner for the Devon Corporation, responded to questions regarding possible pighead pricklebacks taken during environmental surveys of the Devon Corporation.

COLLECTIONS EXAMINED

Cat. No.	No. spec.	Locality	Date collected	Depth (m) captured
TUKTOYAKTUK HARBOUR, NWT:				
NMC 77-1203.2	2	NWT: Tuktoyaktuk Hbr., off SE shore, 5 km SE of Tuktoyaktuk, SE Kugmallit Bay	1971-06-17	
NMC 77-1278.1	2	NWT: Tuktoyaktuk Hbr., SE Kugmallit Bay, Beaufort Sea, 2 km SW of Tuktoyaktuk;	1974-07-16	N/A
NMC 81-1218.1	3	NWT: Tuktoyaktuk Harbour, Kugmallit Bay, Beaufort Sea; Salinity: Salt	1981-07-10	8-10
NMC 83-0069.1	35	NWT: Tuktoyaktuk Harbour-Tuktoyaktuk Peninsula, Beaufort Sea; Salinity: Salt	1975-08-18	5
NMC 83-0075.1	28	NWT: Tuktoyaktuk Hbr., Tuktoyaktuk Peninsula, Beaufort Sea; Salinity: Salt	1975-08-04	4
NMC 83-0077.1	43	NWT: Tuktoyaktuk Hbr., Tuktoyaktuk Peninsula, Beaufort Sea; Salinity: Salt	1975-08-16	7
NMC 86-0575.1	1	NWT: Tuktoyaktuk Hbr., Kugmallit Bay, Beaufort Sea; Salinity: Salt	1970-09-01	N/A
HUTCHISON BAY, NORTH OF TUKTOYAKTUK, NWT:				
NMC 77-1508.4	1	NWT: Hutchison Bay, 5 km E. of Warren Pt, Tuktoyaktuk Pen., Beaufort Sea; Salinity: Salt	1977-08-13	0.15
KAGMALLIT BAY: NWT				
NMC 65-0341C	1	NWT: Kugmallit Bay, Tuktoyaktuk, Northeast of Inuvik, Beaufort Sea	1961-08-22	N/A
NMC 77-1272.1	3	NWT: Kugmallit Bay, Beaufort Sea, 6 km S. of Tuktoyaktuk, Tuktoyaktuk Pen.; Salinity: Salt	1973-07-20	1.15
UAMZ 4890	1	Kugmallit Bay Beaufort Sea near Tuktoyaktuk	31/07/1982	N/A
LIVERPOOL BAY, NWT, NWT:				
NMC 72-0072	ca. 260	NWT: Liverpool Bay	1971-08-09	21 16-18
NMC 77-1226.2	1	NWT: South. Liverpool Bay, Beaufort Sea, 1 km off SW tip of Thumb Is., SW of Campbell Isl.;	1971-08-04	9
NMC 77-1244.1	1	NWT: Southern Liverpool Bay, Beaufort Sea, 1 km off N. shore & about 6 km NE of northern tip of Campbell Island; Salinity: Salt	1971-08-09	
NMC 77-1248.5	4	NWT: Liverpool Bay, Beaufort Sea, 2.5 km off Turnabout Point; Salinity: Salt	1971-08-09	11

NMC 77-1252A.8	4	NWT: Liverpool Bay, 2 km off central North shore & 23 km NE of northern tip of Campbell Island; Salinity: Salt	1971-09-04	6
NMC 77-1252B.8	4	NWT: Liverpool Bay, Beaufort Sea, 2 km off North central shore, 23 km NE of northern tip of Campbell Isl.; Salinity: Salt	1971-09-04	6 0.73
NMC 77-1275.1	1	NWT: Liverpool Bay, Beaufort Sea, 16 km N.E. of Turnabout Point; Salinity: Brackish	1973-08-19	46? 4
NMC 77-1301.1	1	NWT: Southern Liverpool Bay, Beaufort Sea, 5 km N. of SW tip of Thumb Is.; Salinity: Salt	1973-08-22	
NMC 77-1491.3	3 sp. Discarded	NWT: Liverpool Bay, 12 km N. of tip of Turnabout Point, Beaufort Sea;	1977-07-26	
NMC 77-1492.3	1	NWT: Liverpool Bay, about 13.5 air km North of Turnabout Point, Beaufort Sea;	1977-07-26	4
NMC 77-15731	1	NWT: Southern Liverpool Bay, 5 km NE of N. E. tip of Campbell Is., Salinity; Brackish	1976-08-19	7
NMC 86-0577.1	3	NWT: Liverpool Bay, 2 km W. of Turnabout Pt, Beaufort Sea; Salinity: Salt	1971-08-09	N/A
NMC 92-0002	3	NWT: Liverpool Bay	1991-08-04	N/A
NMC 92-0003	3	NWT: Liverpool Bay	1991-08-05	N/A
WOOD BAY (LIVERPOOL BAY), NWT:				
NMC 91-0041	11	NWT: E. side of Wood Bay, Beaufort Sea	1990-07-10	N/A
PHILLIPS BAY, YUKON TERRITORY:				
NMC 92-0001	1	YT: Niakolik Point, Phillips Bay	1986-07-16	N/A
JAPAN				
NMC 84-0232.1	5	Japan: Pacific Ocean off Kushiro, SE Hokkaido; Salinity: Salt	1974-09-06	60-70
UNIVERSITY OF BRITISH COLUMBIA COLLECTIONS				
Note: -, Fish Base (2001 Web page) listed many Canadian records of Lumpenus sagitta housed at the University of British Columbia as *Acantholumpenus*. This species is not known to inhabit British Columbia. Alaskan specimens in the collections still require reexamination.				