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**Central and Arctic Region**

# **Anadromous and Landlocked Arctic Char (*Salvelinus alpinus*) Harvested near Paulatuk, Northwest Territories, 2003–2013**

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## Foreword

This series documents the scientific basis for the evaluation of aquatic resources and ecosystems in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

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## ABSTRACT

Arctic Char (*Salvelinus alpinus*), both anadromous (sea run) and landlocked, are an important traditional food source for residents of Paulatuk, a community within the Inuvialuit Settlement Region of the Northwest Territories. Voluntary community-based harvest surveys were conducted monthly in Paulatuk, between 2003 and 2013, to enumerate fish and marine mammal subsistence harvest. These surveys build on historical subsistence, sport, and commercial fisheries records. Data from these surveys were examined with a focus on the seasonality and location of Arctic Char subsistence harvest. Total anadromous Arctic Char catches peaked in 1982 (5,456 fish) during the period when a commercial fishery operated (1968–1986). Subsistence harvest varied between 479 fish in 2008 and 1,793 fish in 2009, with an average of 1,228 fish over the time period (2003–2013). Summer (June–September) harvests were highest from the coastal area near the mouth of the Hornaday River, although there appeared to be a trend towards increasing harvests at the Lasard Creek area. Landlocked Arctic Char harvest occurred predominantly during spring (May and June); it was lower and more variable than anadromous Arctic Char harvest. Winter (October–December) fisheries primarily targeted anadromous Arctic Char in the upper Hornaday River. In 1998 the Paulatuk Char Working Group led the implementation of community-based management and monitoring measures that included a voluntary anadromous Arctic Char subsistence harvest level. These measures continue to support sustainable management of Arctic Char populations in the area.

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## INTRODUCTION

Paulatuk, Northwest Territories, is a coastal community within the Inuvialuit Settlement Region (ISR) located along the south shores of Darnley Bay, west of the Hornaday River Delta (Figure 1). Anadromous (sea run) and landlocked (lake resident) Arctic Char (*Salvelinus alpinus*) are an important component of the traditional Inuvialuit diet in the community. Many subsistence fishing activities follow the seasonal migrations of the Hornaday River anadromous Arctic Char population. Arctic Char migrate from the river to the sea in spring where they feed during summer, and then return to the river in fall to spawn and overwinter (Harwood and Babaluk 2014). The majority of subsistence-caught anadromous Arctic Char are harvested either by gillnet or jigging (locally known as 'jigging') through the ice. Anadromous char are fished through cracks in the land-fast ice during late-spring, from sites along the coast of Darnley Bay during summer, along the Hornaday River during the late-summer and early-fall migration, and further upriver following freeze-up in October and November. Landlocked char are harvested from inland lakes in the vicinity of Paulatuk, mostly during spring by jigging under the ice.

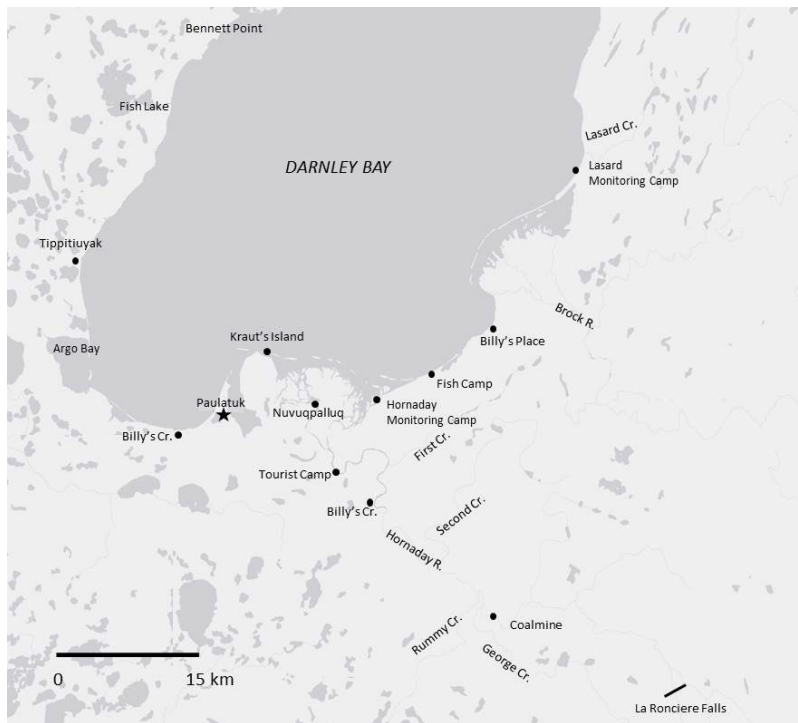


Figure 1. Key fishing locations for anadromous Arctic Char near Paulatuk, NT.

In addition to the community's subsistence fishery there is a history of commercial and sport fisheries in the Paulatuk area. Commercial fisheries targeting Hornaday River anadromous Arctic Char occurred from 1968 to 1986. The Department of Fisheries and Oceans (DFO) initially set a commercial quota of 6,800 kg and production averaged 5,760 kg between 1977 and 1984 (MacDonnell 1988). Commercial fisheries ceased in 1986 due to observed reductions in Arctic Char catches and size and have remained closed since (MacDonnell 1987, 1988). The Hornaday River has had one of the lowest sport fishing limits for Arctic Char in the Northwest Territories. From 1994 to 2013 the daily catch and possession limits were each set at 1 fish, and in 2013 DFO, at the request of the community, reduced the fishery to catch and release only.

The Paulatuk Char Working Group (PCWG) was formed in 1996 with the objective to establish a community fishing plan for Arctic Char, with a focus on the Hornaday River population. The

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PCWG has included representatives from the Paulatuk Hunters and Trappers Committee (PHTC), Fisheries Joint Management Committee (FJMC), Parks Canada Agency (PCA), and DFO, and operates using an adaptive co-management approach established by the Inuvialuit Final Agreement (IFA) (Canada 2005) (Ayles et al. 2007). The need for a fisheries management plan was identified by the PHTC at their 1996 Annual General Meeting. The community was concerned about the numbers and size of Arctic Char in the Hornaday River (PCWG 2006). The PCWG met several times between 1996 and 1998 to develop the Paulatuk Char Fishing Plan (PCFP), which was last updated in 2006. The overarching goal of the PCFP has been to maintain the sustainability of Arctic Char subsistence fisheries in the Paulatuk area, through management, conservation, and habitat protection measures (PCWG 2006).

Based on traditional and scientific knowledge and the overall goal of maintaining sustainable fisheries through a precautionary approach, a voluntary annual subsistence harvest level of 1,700 anadromous Arctic Char was first established by the PCWG in 1998. This harvest level encompassed the harvesting of Arctic Char in Darnley Bay during summer and in the Hornaday River during fall and winter. The voluntary harvest level was raised to 1,800 in 2013, supported by positive stock status indicators observed in the fishery and to meet the subsistence needs of the community. The PCWG has allocated this annual harvest level between summer (open-water) and winter (ice-on) harvesting seasons, with a sub-allocation for the elders' winter fishery. The PCWG has not identified the need to establish voluntary harvest levels for any landlocked char populations in the Paulatuk area.

The PCWG has supported several research and monitoring programs: community harvest surveys; Hornaday River Harvest Monitoring Program (since 1990) (Harwood 1999, Harwood 2009, Gallagher et al. 2017); radio and t-bar tagging studies (Harwood and Babaluk 2014); and biological studies of other Arctic Char populations in the area (Roux et al. 2011).

The collection of harvest data has been identified as a component of management plans and annual reviews by various fisheries management working groups within the ISR given its importance in the management, monitoring, and assessment of population dynamics of fisheries (DFO 1999, DFO 2016, Zhu et al. 2017). Furthermore, the collection of harvest data is valuable for documenting the importance of each species to Inuvialuit diet and culture and identifying fishing locations (Kavik-AXYS 2012, Usher 2002, Usher and Wentzel 1987, Usher et al. 1996). This type of information could help identify mitigation if industrial activity were to have negative environmental effects.

The objectives of this report are to:

- Summarize available anadromous Arctic Char harvest data from subsistence, commercial, and sport fisheries, 1968 to 2013;
- Compare reported harvests of anadromous Arctic Char among different areas and examine for trends, 2003-2013;
- Compare anadromous Arctic Char harvest among seasons, 2003–2013; and
- Summarize landlocked Arctic Char harvest from the Paulatuk area, 2003–2013.

## **METHODS**

### **HISTORICAL HARVEST RECORDS (1968–2002)**

Subsistence, commercial, and sport fishing harvest data records of anadromous and landlocked Arctic Char near Paulatuk have been collected and compiled through various sources since 1968, with some years only having estimates available. Harvest data from past commercial and

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test fisheries (to assess the viability of a new fishery) in the area are summarized in MacDonnell (1987, 1988). Subsistence harvest data have been collected through various community-based survey programs. From 1988 to 1997 the Inuvialuit Joint Secretariat coordinated the Inuvialuit Harvest Study (IHS) in the ISR (Joint Secretariat 2003). After 1997, the respective co-management agencies and government departments had the responsibility of ensuring that harvest information was collected. Records from harvest surveys in 1999 and 2001–2003 were summarized in Stephenson (2004). This report examines harvest data collected 2003–2013 with a focus on anadromous and landlocked Arctic Char.

## **HARVEST SURVEYS (2003–2013)**

Fish and marine mammal subsistence harvest surveys were conducted in Paulatuk, NT from January 2003 to December 2013. Between January 2003 and March 2010 harvest surveys were collaboratively coordinated among DFO, Canadian Wildlife Service (CWS), Government of Northwest Territories Resources Wildlife and Economic Development division (RWED) (now Environmental and Natural Resources), and PHTC. In April 2010 PHTC and DFO took over the coordination of these surveys and focussed on fish and marine mammal harvest data.

The PHTC selected a local community interviewer (locally known as the ‘harvest data collector’) who contacted active subsistence harvesters and asked if they would be willing to report their fish and marine mammal harvest information. The PHTC managed the active harvester list for the community and every individual was assigned a unique number to maintain their anonymity. Surveys were generally conducted on a monthly basis using paper forms to document the species, number, location, and harvest date (Appendix 1). Additional questions were added to the surveys in 2012 to determine if: a) their reported summer harvests were already enumerated by one of the harvest monitors (to avoid double counting), b) whether any char caught during winter were part of the elders’ fishery, or c) if any of their catches were noted to be ‘blue char’ (a morphologically different form of anadromous char reported by the community (Gallagher et al. 2017)). Sport fishers were not interviewed, as that information was collected through the ISR sport fishing registry established under the IFA and managed by the PHTC and FJMC.

The interviewers collected harvest information in person or over the phone at the end of each month. In 2012 the PHTC and PCWG requested that the surveys be conducted twice a month in August and November to improve the monitoring of in-season harvest numbers. Surveys were not conducted during January to March for most years, given that limited fish and marine mammal harvesting takes place during this time.

Completed forms were sent to DFO Inuvik where the data were tabulated and communicated back to PHTC, PCWG, and FJMC. DFO staff worked with local harvesters from PHTC and PCWG (in particular Noel Green, Tony Green, Joseph Illasiak Jr., Diane Ruben, Lawrence Ruben, and Ray Ruben) to identify and map waterbodies, areas, and camps where Arctic Char fishing occurred and to clarify where landlocked and anadromous Arctic Char were caught.

Harvest reports were entered and tabulated by month, year, species, and harvest location. In most cases catch was identified as anadromous or landlocked Arctic Char. If the distinction as to type of char was missing from the forms then local harvesters from Paulatuk used information on the timing and location of the harvest to classify the catch as either anadromous or landlocked. These harvesters also identified and verified important harvest locations through the examination of detailed harvest data and maps.

Anadromous Arctic Char harvests were assigned to three broad geographic areas:

1. Hornaday River, Delta, Fish Camp, and the surrounding coastal area (HR);
2. Lasard Creek area in east Darnley Bay (LC); or

3. West Darnley Bay (including Fish Lakes, Tippitiuyak or “Tippi”, and Argo Bay) (WDB).

Harvests that were not assigned to any of the three geographic areas were assigned as “other”, mostly due to missing catch location.

Anadromous Arctic Char harvests were also categorized into summer (partial to complete open-water, June through to September) and winter (ice-on, October to December) seasons. Landlocked Arctic Char harvest was tabulated annually and by month to illustrate the seasonal nature of the fishery.

In accordance with the IHS (Joint Secretariat 2003), harvest values have been aggregated across locations to protect the interests and wishes of harvesters. Detailed information is held by the PHTC should they wish to use it.

## RESULTS

### ANADROMOUS ARCTIC CHAR

Anadromous Arctic Char harvested from all fisheries between 1968 and 2013 varied from 479 (2008) to 5,456 (1982) (Figure 2, Table 1). The highest annual harvest occurred during the 1970s and 1980s when commercial fisheries were active. Since a voluntary subsistence harvest level was established in 1998 anadromous Arctic Char harvest was consistently lower than the voluntary harvest level, with the exception of 2001 and 2009 (Figure 2). Average subsistence harvest declined over the last three decades from 2,217 fish during 1984 to 1993, to 1,340 fish during 2004 to 2013.

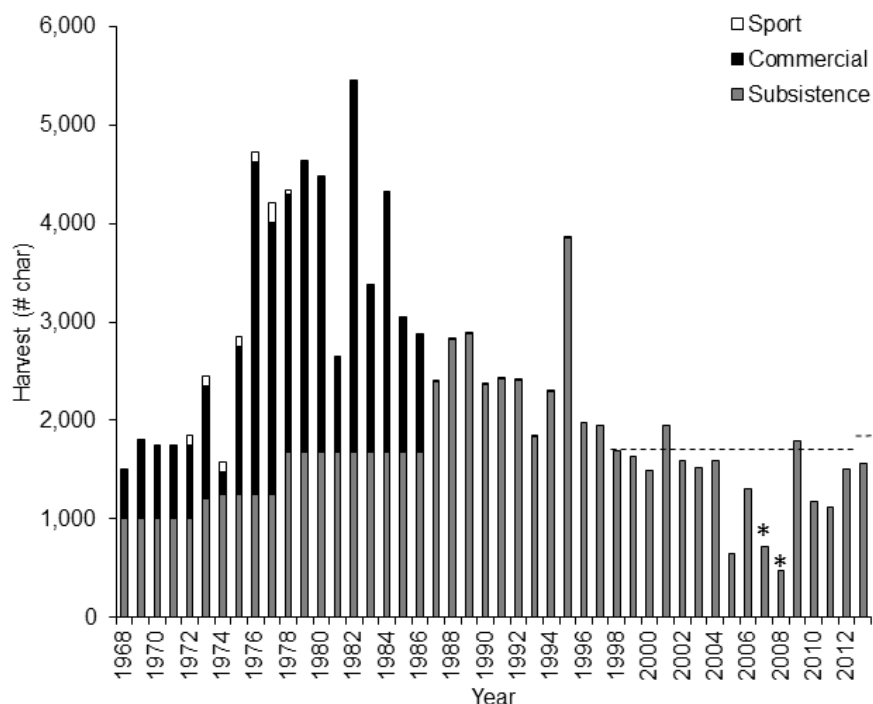


Figure 2. Anadromous Arctic Char harvested from sport, commercial, and subsistence fisheries in the Darnley Bay area, 1968 to 2013 (all seasons and locations). The dashed line is the voluntary total allowable subsistence harvest as determined by the Paulatuk Char Working Group (1,700 fish between 1998 and 2012; 1,800 fish beginning in 2013). The asterisk indicates years where harvest data were incomplete, therefore, total harvest is underestimated.



Table 1. Anadromous Arctic Char harvested from commercial, subsistence, and sport fisheries (1968-2013). Where only weight was recorded, the number of individuals was calculated using a conversion factor of 2.3 kg/fish. Where sport fishing harvest was not available (na) it is presumed low. Sources of information include MacDonnell (1987; 1988), Joint Secretariat (2003), PHTC (2006), and DFO records.

Year	Commercial	Subsistence	Sport	Total
1968	500	1,000	na	1,500
1969	800	1,000	na	1,800
1970	750	1,000	na	1,750
1971	750	1,000	na	1,750
1972	750	1,000	100	1,850
1973	1,151	1,200	100	2,451
1974	229	1,250	100	1,579
1975	1,500	1,250	100	2,850
1976	3,376	1,250	100	4,726
1977	2,757	1,250	200	4,207
1978	2,619	1,676	40	4,335
1979	2,954	1,676	10	4,640
1980	2,794	1,676	10	4,480
1981	972	1,676	na	2,648
1982	3,780	1,676	na	5,456
1983	1,700	1,676	na	3,376
1984	2,650	1,676	na	4,326
1985	1,382	1,676	na	3,058
1986	1,201	1,676	na	2,877
1987	-	2,392	10	2,402
1988	-	2,829	10	2,839
1989	-	2,880	10	2,890
1990	-	2,369	10	2,379
1991	-	2,424	10	2,434
1992	-	2,408	10	2,418
1993	-	1,839	10	1,849
1994	-	2,290	10	2,300
1995	-	3,850	10	3,860
1996	-	1,984	na	1,984
1997	-	1,956	na	1,956
1998	-	1,686	na	1,686
1999	-	1,636	na	1,636
2000	-	1,492	na	1,492
2001	-	1,949	na	1,949
2002	-	1,598	na	1,598
2003	-	1,522	na	1,522
2004	-	1,597	na	1,597
2005	-	655	na	655
2006	-	1,300	na	1,300
2007	-	724	na	724
2008	-	479	na	479
2009	-	1,793	na	1,793
2010	-	1,175	na	1,175
2011	-	1,119	na	1,119
2012	-	1,561	na	1,561
2013	-	1,570	-	1,570

Subsistence harvest of anadromous Arctic Char was variable between 2003 and 2013, ranging from 479 (in 2008) to 1,793 (in 2009) (Table 2, Figure 2). There were some months where survey data were not available either because harvest surveys were not conducted or possibly because records were misplaced. Given that subsistence harvest records were incomplete during the summers of 2007 and 2008, the total harvest from these years is underestimated. Between 2003 and 2013 anadromous Arctic Char harvests occurred between June and December, with the exception of one fish reported caught in May 2012 (Table 2).

*Table 2. Anadromous Arctic Char harvested by month for subsistence fisheries, as reported in Paulatuk community harvest surveys, 2003–2013.*

Year	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
2003	0	0	0	0	0	258	428	701	5	28	102	*	1,522
2004	*	*	*	0	0	63	186	1,083	13	27	225	0	1,597
2005	*	*	*	0	0	80	135	425	1	23	1	0	665
2006	0	0	0	0	0	114	617	437	52	30	0	50	1,300
2007	0	0	0	0	0	57	*	325	109	233	*	*	724
2008	0	0	0	0	0	42	131	*	*	299	*	7	479
2009	0	0	0	0	0	17	64	1014	71	402	207	18	1,793
2010	0	0	0	0	0	43	170	400	46	447	35	34	1,175
2011	-	-	-	0	0	226	400	91	49	163	190	0	1,119
2012	-	-	-	0	1	550	6	733	30	29	212	0	1,561
2013	-	-	-	0	0	24	342	651	28	5	482	38	1,570

- Surveys were not conducted.

\* Survey data unavailable or undetermined, although harvest likely occurred, so total harvest would be underestimated.

Between 2003 and 2013, a higher proportion of the harvest occurred along the coast or in the lower Hornaday River during summer (75.7%) compared to the winter at upstream locations on the Hornaday River (24.3%) (Figure 3, Table 2). Fishing in coastal waters begins in late spring when Arctic Char have begun their migration from the river to the ocean and when the ice is still thick enough for safe travel but cracks start to develop in the ice (Joseph Illasiak Jr., Community of Paulatuk, pers. comm.). Harvesting generally occurs earlier in the Lasard area (July or early-August), compared to the mouth of the Hornaday River or along the south coast of Darnley Bay (late-July and August). Fishing on the west side of Darnley Bay (including Argo Bay, Tippitiuyak, and Fish Lakes) occurs in late-July and August.

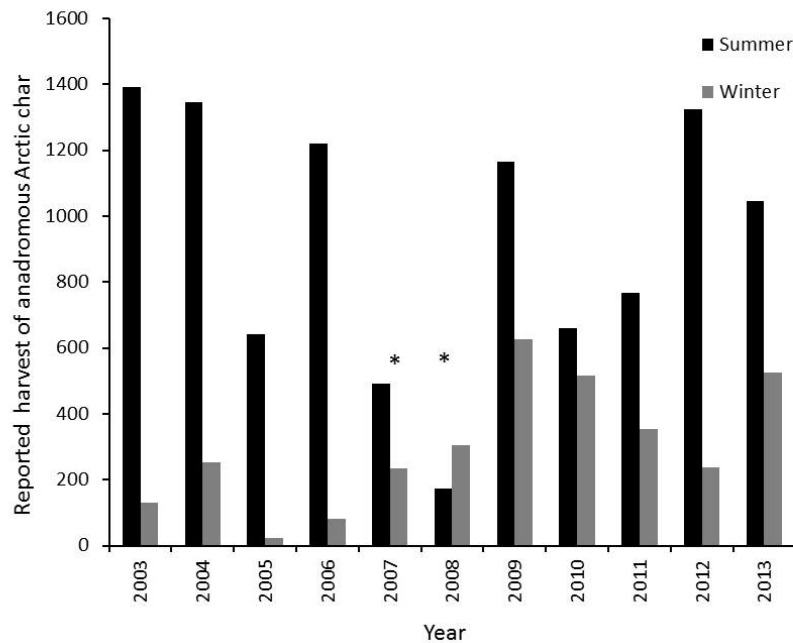


Figure 3. Anadromous Arctic Char harvested by season (open-water (June–September) and ice-on (October–December)), as reported in Paulatuk harvest surveys, 2003–2013. The asterisk indicates years where harvest data were incomplete, therefore, total harvest is underestimated.

Once ice formed on the Hornaday River fishing would take place around Coalmine, Tourist Camp, and Nuvuqpalluq (the Bluffs/First Hole area), using a combination of gill nets or jigging. Fishing for char in the upper Brock River is possible but was uncommon, given that it is much further away from the community (Roux et al. 2011).

For most years the harvest reported from the Hornaday River area (on the coast or upriver) was greater than for Lasard Creek or West Darnley Bay (Figure 4, Table 3). Although variable there has been an increase in the number of Arctic Char harvested from the Lasard Creek area since 2009, while catch from the Hornaday area was relatively stable over the same time period. This is consistent with community reports that summer fishing at the coastal area near Lasard Creek has been very productive in recent years (with the exception of 2013 when ocean conditions were unfavourable for travel to that location). Harvests in the west Darnley Bay area were consistently lower than either Hornaday River or Lasard Creek areas, consistent with results reported in Gallagher et al. (2017).

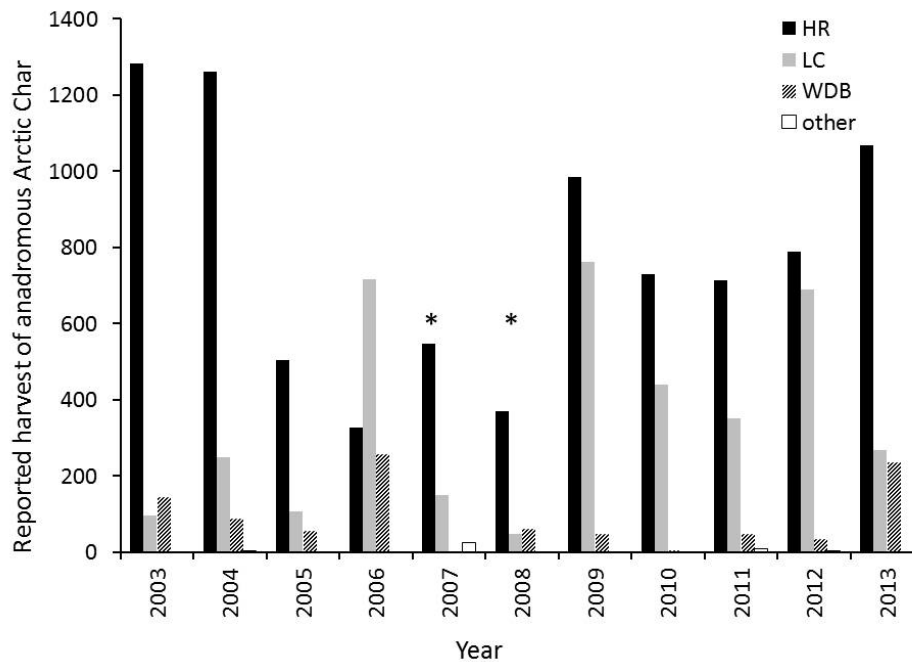


Figure 4. Anadromous Arctic Char harvested by fishing area (HR=Hornaday River, Delta, and surrounding coastal area; LC=Lasard Creek area; WDB= West Darnley Bay (including Fish Lake, Tippitiuyak and Argo Bay)). The asterisk indicates years where harvest data were incomplete, therefore total harvest is underestimated.

Table .3. Anadromous Arctic Char harvested by fishing area (2003-2013) (HR=Hornaday River, Delta, and surrounding coastal area; LC=Lasard Creek area; WDB= West Darnley Bay (including Fish Lakes, Tippitiuyak and Argo Bay)).

Year	Areas				Total
	HR	LC	WDB	Other	
2003	1,282	96	144	-	1,522
2004	1,261	248	87	1	1,597
2005	503	107	55	-	665
2006	326	717	257	-	1,300
2007*	548	151	-	25	724
2008*	369	48	62	-	479
2009	983	762	48	-	1,793
2010	730	440	5	-	1,175
2011	713	350	48	8	1,119
2012	837	690	33	1	1,561
2013	1068	267	235	-	1,570

\* Years where harvest data during the peak fishing period were incomplete (see Table 2), therefore, total harvest is underestimated.

The Tippitiuyak area has been the primary location in Darnley Bay where ‘blue char’ are reported (Tony Green, Community of Paulatuk, pers. comm., Gallagher et al. 2017); 51 out of the 235 char harvested in west Darnley Bay in 2013 were classified by harvesters as ‘blue char’.

## LANDLOCKED ARCTIC CHAR

As noted above for anadromous Arctic Char, subsistence harvest records were incomplete for the summers of 2007 and 2008, therefore, landlocked Arctic Char harvest from these years is also underestimated (Table 4). Harvest of landlocked Arctic Char was variable between 2003 and 2013, averaging 241 fish annually and ranging from 80 (2013) to 431 (2006) (Table 4, Figure 5). Landlocked Arctic Char were harvested between April and October, with a majority caught during May and June (89.1%). Lakes with landlocked Arctic Char are most accessible during spring by snowmobile, when temperatures and daylight are more favourable for travelling (Joseph Illasiak Jr., Community of Paulatuk, pers. comm.). Annual landlocked Arctic Char harvest was consistently lower than anadromous Arctic Char.

*Table 4. Landlocked Arctic Char harvested by month for subsistence fisheries, as reported in Paulatuk community harvest surveys, 2003–2013.*

Year	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
2003	0	0	0	0	6	105	24	84	0	0	0	*	219
2004	*	*	*	22	20	251	0	1	1	0	0	0	295
2005	*	*	*	2	69	135	30	0	0	4	0	0	240
2006	0	0	0	0	115	301	0	15	0	0	0	0	431
2007	0	0	0	4	0	152	*	0	0	0	*	*	156
2008	0	0	0	0	148	144	20	*	*	0	*	0	312
2009	0	0	0	0	170	123	26	0	0	0	0	0	319
2010	0	0	0	11	86	56	0	0	0	0	0	0	153
2011	-	-	-	0	42	44	22	3	0	0	0	0	111
2012	-	-	-	0	173	141	0	0	20	0	0	0	334
2013	-	-	-	0	0	80	0	0	0	0	0	0	80

- Surveys were not conducted.

\* Survey data unavailable or undetermined, although harvest likely occurred, so total harvest would be underestimated.

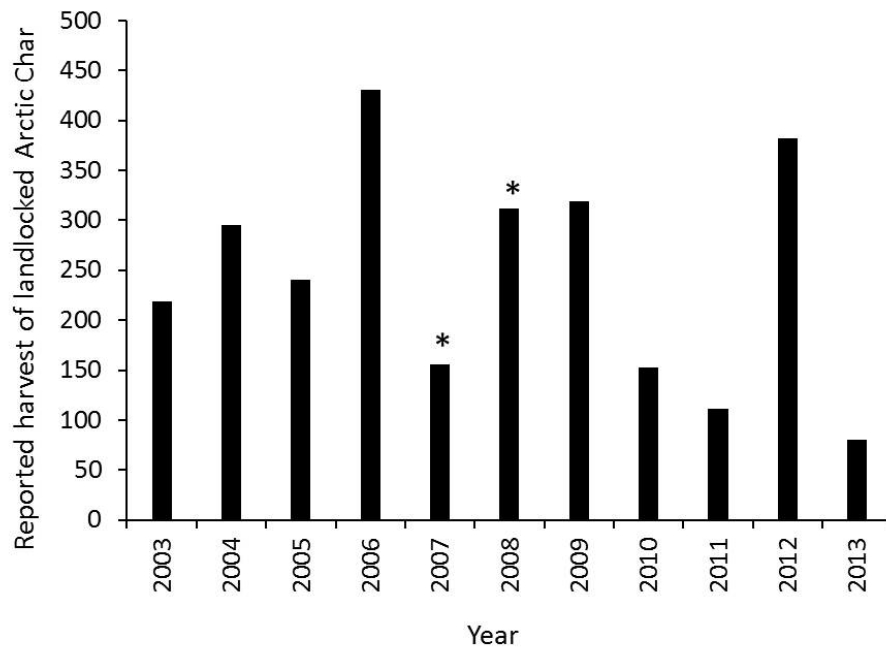


Figure 5. Landlocked Arctic Char harvested in the Paulatuk area, as reported in community harvest surveys, 2003–2013. The asterisk indicates years where harvest data were incomplete, therefore, total harvest is underestimated.

## DISCUSSION

Interaction among socioeconomic, biological, environmental, and other factors could drive spatial and temporal patterns in Arctic Char harvest. Socioeconomic factors include community population size, number of active harvesters, location and timing of harvesting activities (for fish and other wildlife), dependence on local foods, employment opportunities, and fuel and equipment prices. An example of socioeconomic change in the Paulatuk area is a change in the number and age of community harvesters (Lawrence Ruben, Community of Paulatuk, pers. comm.). Biological factors include Arctic Char population size, age and length of fish, and migration timing and routes. Environmental factors include weather and water conditions (especially wind on the coast), timing of seasonal break-up and freeze-up, changes in physical habitat such as migratory routes, and ice conditions. One of the major factors driving variability in harvest at the Lasard Creek area has been the coastal weather and water conditions, given that it takes significantly longer to travel there by boat and the area is more exposed, often with rougher seas (Ray Ruben, Community of Paulatuk, pers. comm.). Furthermore, the community has noted changes in the Hornaday River Delta with a changing climate, which have negatively affected the flow and the quality of fishing in this area over time (Joseph Illasiak Jr., Community of Paulatuk, pers. comm.). These observations underscore the importance of traditional and local knowledge in understanding and interpreting harvest data. The presentation of harvest data on an annual basis to the PCWG allows for local experts to apply their knowledge and observations to make assessments and interpretations in an adaptive co-management setting (Ayles et al. 2007).

Community harvest surveys are most effective when there is a high level of participation and accuracy in reporting. Participation largely relies on individuals being available and willing to take part in the survey. If individuals were unavailable on the first visit community interviewers

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made an effort to collect information at a later date. Furthermore, interviewers were hired through the PHTC to ensure harvesters would be comfortable sharing their catch information. Reporting accuracy was improved through the use of calendars or notebooks that many harvesters used to record daily catches. Participation rate in these surveys was high, based on feedback from harvesters and the PCWG, and the majority of community members have consistently been willing to voluntarily and accurately report their harvest (Tony Green and Joseph Illasiak Jr., Community of Paulatuk, pers. comms.). Subsistence harvesters from Paulatuk have continued to recognize the value in these surveys and have been proactive in the sustainable management of their fisheries, therefore, we are confident in the approach taken to produce a best estimate of Arctic Char harvest for the Paulatuk area.

Discussions have arisen at the PCWG as to whether catches from areas other than the Hornaday River, such as Lasard Creek, should be included within a single voluntary harvest level for the whole Paulatuk area, or if separate harvest levels should be established. However, contributions of Arctic Char from the Hornaday and Brock rivers to the different coastal areas was unknown. Traditional and scientific knowledge presumed that the coastal harvest was comprised primarily of Hornaday River char. This was confirmed recently using a genetic mixed-stock fishery analysis. The Hornaday River and Brock River populations of Arctic Char were found to be genetically distinct, and 90 percent of Arctic Char harvested at coastal locations near the Hornaday River and Lasard Creek originated from the Hornaday River (Boguski et al. 2016, Harris et al. 2016). The similarity in stock composition between these two coastal harvesting areas allows for more informed decisions with respect to area-specific harvest levels, thereby making it less important to consider separate management zones. Although the samples collected from Tippitiuyak were not assessed as a part of this genetic analysis, the proximity of the Hornaday River relative to other known source populations, demographic similarities (Gallagher et al. 2017), and a t-bar tag return from an Arctic Char originally tagged on the Hornaday River and caught in Argo Bay (Harwood and Babaluk 2014) would suggest that this coastal area is also used by the Hornaday River population during summer. Paulatuk fishermen are also interested in determining the origin of 'blue char', a type of Arctic Char reportedly different than 'river char' (see Gallagher et al. 2017), and observed at a higher rate in west Darnley Bay (Tony Green, Community of Paulatuk, pers. comm.).

Inuvialuit harvesters are leaders in conservation, adaptive management and monitoring of their resources, and are supported by the co-management structure set out in the IFA (Ayles et al. 2007). They use various traditional harvesting practices such as fishing different areas on a rotational basis and taking only what they need to ensure the long-term sustainability of fisheries for future generations. Several of these traditional harvesting practices specific to the Paulatuk area are identified in the PCFP (PCWG 2006) as well as the Paulatuk Community Conservation Plan (PHTC et al. 2016). The establishment of the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA) in November 2016 also highlights the importance of the west Darnley Bay area for Arctic Char, cod, beluga whales, ringed and bearded seals, polar bears, and sea birds (Chambers and MacDonnell 2012, Kavik-AXYS Inc. 2012). Inuvialuit harvesters are often the first to recognize signs of environmental change (Kokelj et al. 2012) and continue to show leadership in the development and implementation of community-based management measures.

The PCWG has effectively co-managed Arctic Char populations in the Paulatuk area through the incorporation of traditional and scientific knowledge at all stages, including the implementation of a voluntary subsistence harvest level, to promote the sustainability of fisheries for future generations. Working group meetings are a forum to review, verify, and interpret harvest data and other information sources on an annual basis and to establish the management measures (including harvest level) for the upcoming fishing season. Harvest

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records, in conjunction with annual harvest monitoring programs and local observations brought to the table by community harvesters, are essential to implementation of the fisheries management plan.

## **CONCLUSIONS**

Harvesting of Arctic Char continues to be an important cultural and subsistence activity for the Paulatuk community. Between 1968 and 2013, anadromous Arctic Char harvest varied between 479 and 5,456 fish, with the highest catches taken during the 1980s when a commercial fishery operated in the area. Closure of the commercial fishery and implementation of a voluntary subsistence harvest level by the PCWG in the 1990s have been effective in the sustainable management of anadromous Arctic Char populations in the Paulatuk area.

Results presented in this report highlight the seasonality of the environment in the Paulatuk area, and how harvesting activities are based on both accessibility to fishing sites and annual migrations of anadromous Arctic Char. Although the number of landlocked Arctic Char harvested annually was lower relative to anadromous Arctic Char, fishing for landlocked char during spring continues to be important to Paulatuk harvesters. Summer harvests of anadromous Arctic Char were consistently higher than winter fisheries further upriver in the Hornaday River, although the contributions from the different seasons were variable among years. The coastal area at the mouth of the Hornaday River continues to be one of the most important harvesting areas for the summer fisheries in terms of total numbers. However, there is evidence that the community has shifted some of their harvesting to the Lasard Creek area in recent years when travel and fishing conditions were favourable. Although Arctic Char harvest in western Darnley Bay, including within the ANMPA, were consistently lower relative to other areas, this area continues to be important for the community of Paulatuk, and fishing in these locations have tended to have a higher proportion of reports of 'blue char' relative to other coastal fishing areas in Darnley Bay.

The voluntary harvest level is the primary tool used to manage this subsistence fishery and the community-based harvest survey is used by the PCWG, PHTC, and Paulatuk harvesters to monitor harvests. Regular review of the harvest time-series along with data collected from harvest monitoring programs, and assessment of scientific, traditional, and local knowledge by the PCWG, will continue to ensure the sustainable management of Arctic Char populations. This adaptive co-management approach will ensure food security is maintained for residents of Paulatuk.

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## APPENDIX 1. EXAMPLE OF A BLANK HARVEST SURVEY FORM

<b>Paulatuk 2013-14 Fish and Marine Mammal Harvest Study</b>	Harvester Number	Community Paulatuk
	Interview Date	Interviewer
Harvest information from: _____ to _____		

**Did you fish or hunt whales/seals this month:**  YES  NO, if YES then fill in harvest information.

**Harvest Code:**

1) Harvested	2) Tried, but no harvest	3) Did not Harvest
4) Could not contact	5) Did not want to be interviewed	6) Other (please specify)

FISH				
Harvest Code	Species	Harvest Date	Number	Harvest Location
	Arctic Char (Sea-run)			

**Of these Arctic Char harvested:**

- a) Were these already accounted for by the summer char monitor?  
 YES  NO  PARTIALLY If partially, how many were already accounted for? \_\_\_\_\_
- b) Were these caught as a part of the winter elders' fishery?  
 YES  NO  PARTIALLY If partially, how many? \_\_\_\_\_
- c) Were any of these blue char?  
 YES  NO If yes, how many and where were they caught? \_\_\_\_\_

	Lake Trout			
	Broad Whitefish			
	Lake Whitefish			
	Lake Herring			
	Landlocked Arctic char			
	Other (specify)			

MARINE MAMMALS						
Harvest Code	Species	Harvest Date	Number Harvested	Struck & Lost	Sex	Harvest Location(s)
	Beluga					
	Ringed Seal					
	Bearded Seal					

(Male = M, Female = F, Unknown = UK)

**OTHER COMMENTS:**

How was fishing/hunting compared to previous seasons?

Did you notice anything unusual (e.g., unusual fish, scars, parasites)?  YES  NO

If YES, please explain