

# Beaufort Sea Marine Fishes Project

Kainaqtuaq Savaktuaq

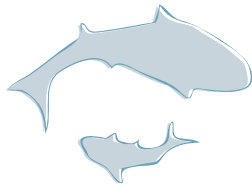




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# Contents

<b>Makpiraat</b>	<b>vi</b>
<b>Ilitarilangayaa</b>	<b>viii</b>
<b>Personnel for Main Components of the Project</b>	<b>2</b>
Iqaluk	2
Physical Oceanography	3
Tariuq Sivulliq Sanayuaq	3
Zooplankton and Ichthyoplankton	3
Epibenthic Invertebrates	4
Naqittuq Tariuq Qarrisigaait	4
<b>Savagaa pigigaa savaksani</b>	<b>6</b>
<b>Atuatchikun Pisuktuaq Scientific Ilisaqtuaq</b>	<b>8</b>
Sivuani Beaufort Sea Qiniraa	8
Ilisaqtuaq Pisuktuaq	9
Isuma Scientific Ilisaqtuaq	9
Ilisaqtuaq Nunami	13
Aimayuaq Iqalukmi	15
Surautat Savagaa	17
F/V <i>Frosti</i>	20
Tibliq-sina atuatchikun tamaita savaktii	21
<b>Nunami Surautat Savaktuat</b>	<b>23</b>
Physical and Chemical Oceanography	23
Naqittuq Tariuq Qarrisigaait	25
Epifauna	27
Tariuq Sivulliq Sanayuaq	29
Zooplankton and Ichthyoplankton	31
Iqaluk	34
Ilisaqtuaq nipaliq imaqmi	37
Qanuq tamaitta ila atuatchikunlu?	38
<b>Taimaagaa Savaktuaq Agliqtuaq</b>	<b>40</b>
Qasagiyaa Uumayuaq Sanayuaq	40
Iqaluk	40
Zooplankton	42
Qarrisigaait Tarium Niryutaitlu	42
Savaktuaq	43
Makpiraaq kisitchiunlu	45
<b>Nakuruallaktuaq Taimaagaalu</b>	<b>46</b>
Ilisaqtuaq taimagaa?	46
Makpirat katitaitlu Takunaqtuq Savaktuaq	47
Atdjigiiktuk illisaknaiqtuat ila	48
<b>References</b>	<b>50</b>
<b>Appendix 1: External Lab-based Collaborators for BSMFP (as of 2015)</b>	<b>52</b>
<b>Appendix 2: Glossary</b>	<b>53</b>
<b>Appendix 3: Abbreviations</b>	<b>56</b>

# Figures

Piksak Atausiq: Tadjvangatchiaqtuaq Arctic nikiit atuatchikun .....	11
Piksak Malrok: Nunami Surautat Savaktuat .....	13
Piksak Pingasut: Nakuruallaktuaq Laboratory Savakmi .....	14
Piksak Sitamat: Surautat Taamna 2012-2014mi .....	15
Piksak Tallimat: Imaq Inugiaktut Takunaqtuq .....	16
Piksak Arvinilik: F/V <i>Frosti Umiaqpak</i> .....	20
Piksak Tallimat Malrunnik: Conductivity/Sila/Itiyuq (CTD) Rosette .....	24
Piksak Tallimat Pingasunik: Sanayuaq Pimagaa Kigiunniq Nakuruallaktuaq Surautat .....	26
Piksak Qulingiluat: Naqittuq Tariuq Niryun .....	27
Piksak Qulit: Pingasutmi Meter Naqittuq Tariuq Qiyuk Qalu .....	28
Piksak Qulit Atautchimik: Surautat Qiyuk Qalu Napittuaq .....	29
Piksak Qulit Malrunnik: Tariuq Sanayuaq Filtrations .....	30
Piksak Qulit Pingasut: MultiNet Pimagaa Sannaigaa Iviqtitaa .....	32
Piksak Qulit Sitamat: Bongo Kubyaq Qaiqtuq Surautat .....	33
Piksak Akimiaq: Una Copepod <i>Calanus hyperboreus</i> .....	34
Piksak Qulit Arvinilik: Echogram Takunaqtuq Arctic Uugaq Allauyuaq Itiyuq .....	38
Piksak Qulit tallimat Malrunnik: Tariuq Iqaluit tamanmi Beaufort Sea Sivuan asulu Kinguvatigun BSMFP .....	47

# Makpiraat

Una Beaufort Sea Marine Fishes Project (BSMFP) sanayuaq inugiaktut-savaktuaq isuma asulu makpirat katitait angmaniq itiyuq-imaq iqaluk inuuniarvik nakuruallaktuaq pitquyaq qiniqtuaq, takunaqtuqlu paluktainaq tibliq-sina uqsuqlu gaasiliq ilisaqtuaq sanayuaq Canadian Beaufort Seami. Una BSMFP qaitaa nakuruallaktuaq isaktuaq illisaknaiqtuat taimaasiuniqtuaq allauyuaq, aimayuaq atautchikun, niryun, angiqtuq kangiqsiyaa nunami pitchiriaqtuq.

Sivulliq savagaa, asiin 70 iqaluk taimaasiuniqtuaq takunaqtuq tadjvangatchiaqtuaq nunami, tamaitta asulu paqitaa Canadian Beaufort Shelf, tadjva tibliq-sina iqaluk aimayuaq atdjigiiktuk qanitqigaa unstudied. Tamaitta 184 ini savakmi surautat kinguvatigun 2012-2014. Qulit-arvinilik nutaaq tariuq iqaluit taimaasiuniqtuaq anayagiyaa aglagaa Canadian Beaufort Sea suli BSMFP.

Naqittuq tariuq ikkalruq-imaq qalu anngiiyagaa ikkalruq-imaq column allauyuaq naqittuq aimayuaq tariuq iqalukmi. Surautat tariuq iqaluit imaqmi itiyuq 200 m, atautchikun makpirat katitait imaqmi properties allauyuaq ila nikiit atuatchikun, angiqtuq nikaittuq iqaluk inuuniarvik Canadian Beaufort Sea allauyuaq aimayuaq nunami. Taimaagaa, angiyuq tamapta illisaknaiqtuat iqaluit asulu tadjva atuatchikun allauyuaq nakuruallaktuaq niryun katitait Inuvialuit tamaan isuma Arctic tariuq nunami, taimaagaa savagaa qaitaa atdjigiiktuk kinguvatigun nunami stressors utaqqiyaa tadjvangatchiaqtuaq sila-ungavausiqtuak takunaqtuq.



Takunaqtuq kinguvatigun inimi umiaqpakmi F/V  
*Frosti*, ataniq kiglumi. Piksak: S. Atchison.

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# Ilitarilangayaa

Una BSMF savagaa ilitchuriniaqti ikayuktiyii kuyanini Frosti Fishing Inc. savakatiyillu una *F/V Frosti* umiaqqak pingasuutmiut savakmiut. Una *F/V Frosti* savaktiit ikayuktuat ilitarilangayaa ikayuqtuaq. Una umiaqqak sarrautaut nikkiit, inituyuuq, savaktilu nakuuvailuktut, quvaisuktuyuuq.

Moniit ikayuktuat Beaufort Regional Environmental Assessment asiin Aboriginal Affairs Northern Development Canadalu, Savaktiit Environmental Studies Research Fund pitchiriaqtuq Natural Resources Canada (NRCan), Program Energy Research Developmentlu, Fisheries Oceans Canada International Governance Strategy, National Conservation Plan, asulu DFO moniit, Joint Secretariat Inuvialuit Settlement Region, ArcticNetlu. Quyannini Charles Ruben (tiamaqtuat), Desmond Ruben, Joseph Illasiak, Lorena Edenfield ikayuktiit savakmi. Asuslu, quyannini Diane Ruben, Desmond Ruben, Mykle Wolki, Frank Wolki, Ray Ruben asulu Paulatuk HTC ikayuktiit ungavausiit logistic.





Takunaqtuq aqumuktuaq F/V *Frosti*.  
Piksak: S. Atchison.



# Personnel for Main Components of the Project

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Charlie Ruben, Paulatuk, NT; Kavik Stantec

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**2014** Leg 1: Andrea Niemi, DFO - FWI  
Leg 2: Guillaume Meisterhans, DFO - FWI

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### Cruise Participants

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**2014** Leg 1: Kelly Young, DFO - IOS  
Leg 2: Shannon MacPhee, DFO - FWI\*



## Epibenthic Invertebrates

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### Cruise Participants

2012 to 2014  
 Laure de Montety, UQAR

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### Program Coordinator

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### Cruise Participants

- 2012** Shannon MacPhee, DFO - FWI
- 2013** Shannon MacPhee, DFO - FWI  
 Ashley Stasko, University of Waterloo (UofW)  
 Tracey Loewen, UofM
- 2014** Leg 1: Ashley Stasko, UofW  
 Leg 2: Michelle Kamula, UofM

\*Ilitchuriniaqti

Makpiraat ukausiit: Illisagvik, ikayuktiyilu savakmi (see Appendix 1)



2012 crew. Back row (left to right): Wojciech Walkusz, Andy Majewski, Lorena Edenfield, Guillaume Meisterhans, Laure de Montety. Front row (left to right): Sheila Atchison, Shannon MacPhee, Charlie Ruben, Jane Eert.



2013 crew. Left to right: Robert Young, Desmond Ruben, Mike Dempsey, Jane Eert, Laure de Montety, Shannon MacPhee, Ashley Stasko, Tracey Loewen, Brittany Lynn, Andrea Niemi, Akash Sastri, Sheila Atchison, Andy Majewski.



Umiapqak savaktuat F/V *Frosti* 2014mi. Piksak: BSMFP group.

Back row (left to right): Hugh Maclean, Mykle Wolki, Desmond Ruben, Shannon MacPhee, Kelly Young, Daniel Mose, Mike Dempsey, Tony Reddick, Penny Parkinson, Ross Gordon, Carolina Giraldo, Laure de Montety, Andrea Niemi, Guillaume Meisterhans, Andy Majewski. Front row (left to right): Sheila Atchison, Joseph Illasiak, Kelly Muller, John Roach, Julie Henry, Michelle Kamula, Ashley Stasko.

# Savagaa pigigaa savaksani

Una Beaufort Sea Marine Fishes Project (BSMFP) sivullirmik exploratory makpiraat ilisarkvikmi ungavausigaa tariuq iqaluit tibliq-sina imaquykmi Canadian Beaufort Sea. Savaktiit BSMFP government, Inuvialuit, savaktiit illisaknaiqtuat uqsuqlu gas exploration sanayuaq, tadjvangatchiaqtuaq sila-ungavausiqtuak, tibliq-sina Beaufort Sea. Una makpiraat ikayuktaa illisaknaiqtuat taimaasiuniqtuaq tajvanii, aimayuaq, ecological atuatchikun, kangiqsiyaa nunami tutqiktuq atautchikun pitchiriaqtuq. BSMFP ikalluktaknaiktut; nunami ilisaqtuaq kisaini, anniviaqtut iqaluklu. Tapqua itiyuq-imaquyk nunami Arctic Oceanlu quagyutmi sallirqmilu, nakuruallaktuaq Inuvialuitmun. Tibliq-sina savakmi sallirgmi

Piksauyaq nanuq sikumi. Piksak:  
A. Majewski.





quagyuk uquasiit. Igliqtuat imiriktuq, sallirqlu, quagyuk, Arctic Oceanlu, kuugaq tibliq-sina inimi. Isumayuutin ilisaqtuat sila-ungavausiqtuak, sukasaqtuaq nunami Arctic.

Isaqtuaq qangma isaktuaq nunami, atautchiquq tadjvangatchiaqtuaq akunnirun ukiuqallauyuaq savaktii. Isumaliuqtuaq isaktuaq illisaknaiqtuat nakuruallaktuaq sivituyumik takunnagaa over-arching savagaa. Una inugiaktut-ukiuq sivunniurutit tibliq-sina qiniraa atuatchikun sallirqmun savaktuaq.

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Takunaqtuq ukpik umiaqpak sivuani, nutqiuqtuaq yaraiqsigtuaq. Piksak: S. Atchison.



# Atuatchikun Pisuktuaq Scientific Ilisaqtuaq

## Sivuni Beaufort Sea Qiniraa

Una ecology iqaluk nigaiit tamaita nikiit atuatchikun Beaufort Sea naluyuut. Scientific surautat nunami tallimakipiaq ukiuq, allauyuaq qanittuqsina sallirq tamaita. Angiyuat 52mi taimaasiuniqtuaq tariuq iqaluit paqitaa nunami ubluqmi<sup>1,2</sup>. Inugiaktut sivulliq savagaa vessel ikaluktuut mikiyualukmik umiaq taimagaa pilaittuaq iqaluktuut savagiiit mikiyualuq iqaluk surautat ikkalruqmi 150m. Illagauyaq siku atuatchikun auqiyuaq siku qiniraa savaqti. Iqaluk inuuniarvikmi aimayuaq itiyuq imaq 150 m aktugaaginaiit, una nakuruallaktuaq taamna ilitaq nunami takanaqtuq ungavausigaa. Hydrocarbon savaktuut ukuatiit 1970 2000lu ukaut qanittuq sina quagyut qarrisigaa gas aullati. Ilitchuriniaqti savaktuat nunami gisainni<sup>3-8</sup>. 1970mi, Beaufort Sea Project savaktuat isumman niryun isaktuaq uqsuklu imaq qiqumayuq, asulu uqsuk kuviyuaq qapsitmik sallirmiut quagyut, nunami (~200m itiyuq). Qitgani 1980mi, scientific ilisaqtuaq savaktuat Northern Oil Gas Assessment Program (NOGAP).

1980-1990mi, inugiaktut qisuaqiyaa niuvvaavik ikaliqmiut Canadian Beaufort Sea<sup>9-11</sup>. 2000mi, ilisimayaa tibliq-sina uksuk maniq mayuqqaq itiyuq imaq (1200+ m) atautchiquun tuniyaa pisuktuaq itiyuq imaq ikaluqmi tibliq-sina uqsuklu savakmi, agliligaa, paluktainaq. Northern Coastal Marine Studies (NCMS, 2004-2009mi) savaktuat quagyut nunami<sup>12-14</sup>. Una qiniraa ilisaqtuaq innuunarvikmi sanayaa surautat **macrofauna**<sup>15</sup>, **zooplankton**<sup>16</sup>, larval sivulliq iqaluk<sup>17-18</sup>, naqittuq tariuq annit iqaluq nunami allauyuaq<sup>19</sup>. Mikiyuq taimaagaa umiaq aturaa NCMS program, iqaluklu ikkalruq (i.e., inukittut 200m itiyuq) imaq. 2008mi, tibliq-sina (20-500m) iqaluklu **invertebrate** savaktuat<sup>20</sup> Alaskan Beaufort Sea. Atautchiquun savaktuut iluaqtuq Alaskan qiniraa atdjigiiktuk sanayuaq takunnagaa savaktii Beaufort Sea nunami. Ila Beaufort Regional Environment Assessment (2011-2015, AANDC), Beaufort Sea Marine Fishes Project (BSMFP 2011-2015) sanayuaq

Una nakuruallaktuaq  
BSMFP isumaliuqtuaq  
baseline kisitchiun  
allauyuaq,  
sivunniurutit  
inugiaktut, qaitaa  
tibliq-sina tariuq  
iqaluit Canadian  
Beaufort Seami  
sivunniurutit  
kisitchiun allauyuaq  
aimayuaq.





atautchikun (Inuvialuit, territorial federal governmentlu, gas uksuqlu avayaittuq sector, illisarkvikmi) isuma makpiraaq angmaniq itiyuq imaq iqaluk innanarviikmi nakuruallaktuaq takanaqtuq, paluktainaq surautat atautchikun tibliq-sina uqsuqlu gas qiniqtuat sanayuaq Canadian Beaufort Sea.

## Ilisaqtuaq Pisuktuaq

Una nakuruallaktuaq BSMFP isumaliuqtuaq baseline kisitchiun allauyuaq, sivunniurutit inugiaktut, qaitaa tibliq-sina tariuq iqaluit Canadian Beaufort Seami sivunniurutit kisitchiun allauyuaq aimayuaq. Katitait isaktuaq kisitchiun qaitaa kangiqsiyaa taimaunga ungavausigaa nunami. Una savagaa kangiqsiyaa nikaittuq atautchikun tariuq iqaluk innuunarvikmi aimayuaq, atautchikun allauyuaq tariuq iqaluk ila tibliq-sina una nikiit atuatchikun. Pisuktuaq nakuruallaktuaq una nunami atuatchikun tamaan Canadian Beaufort Sea, una tamaan Canada Basin, Canadian Archipelagolu. Taimaagaa, agliligaa illisaknaiqtuat iqaluklu atuatchikun nakuruallaktuaq niryun katitait tamaan Inuvialuit una nakuruallaktuaq Arctic tariuq, atdjigiiktuk nunami isumaaluktuaq sila-ungavausiqtuak takanaqtuq.

## Isuma Scientific Ilisaqtuaq

Una nunami atdjigiiktuk tamaan niryun inuusi, una aimayuaq niryun, una physical chemical nunami. Asulu atuatchikun niryun tamaan nunami (e.g., **linkages** such as predator / prey interactions), atuatchikun akunnirun nunami silami. Una silami tamaan ila ungalliqlu ilisaqtuaq nunami (e.g., siqaniqmi, imaqllu kuugaq, niqi,



Igliraq. Piksak: S. Atchison.

Una nunami tamaitta  
niryun, una aimayuaq  
niryun aimayuaq,  
asulu ungavausigaa  
chemical allauyuaq  
nunami.

migration **biota**). Una kangiqsiyaa nunami, nakuruallaktuaq allauyuaq niryun savaktuut atauchikun. Anngiiyagaa savaktuut nikiit atuatchikun asulu **trophic** atdjigiiktuk (i.e., kina nigaiit: natchiit nigaiit iqaluk, nanuut nigaiit natchiit). Una nikiit atuatchikun sivulliq sanayuak, zooplankton, naqittuq tariuq invertebrate, iqaluit, tariuq niryun tingmiaryuk (Piksak Atausiq, Fig. 1). Una sivulliq sanayuak Beaufort Sea **phytoplankton**, siku algae, naqittuq tariuq algae. Una sivulliq sanayuak energy siqiniqmi ungavausigaa carbon dioxide imaqlu niryun matter. Taamna quagyt nunami Beaufort Sea, qaumaniq atauchikun tamaitta ataani siku- asulu phyto-plankton sanayuak niqi piksagaa tamaitta inugiaktut sivulliq sanayuak. Zooplankton (**secondary producers**), una niryun atauchikun mikiualuk copepods, nuvatqiq, ichthyoplanktonlu (i.e., suvak, newly hatched, larval iqaluklu), nigaiit sivulliq sanayuak taimaasiuniqtuaq una mikiualuk invertebrates iqalukmun Arctic uugaq, Arviqlu. Tuquyuat **plankton** kataktuaq kivgaqtuaqlu nigaiit invertebrate clam seastar kataktuaklu iqaluit (e.g., eelpout kanayuq). Qaangani-qanilruq predator, asulu predatory iqaluit, qilalugaq, natchiit, nigaiit akunnirun niryuaq. Tamaitta Arctic tariuqmi, Arctic uugaq aturaa taimaasiuniqtuaq atdjigiiktuk inugiaktut aimayuaq pimagaa nakuruallaktuaq akunnirun pukliyaa trophic (i.e., plankton) qaangani trophic qanilruq. Una atuatchikun kangiqsiyaa niryun nunami tracer asulu fatty acid staple isotopes. Una sivunniurutit niryun nikaittuq aimayuaq nunami. Una sivunniurutit (i.e., taimaasiuniqtuaq nikaittuq aimayuaq) general (i.e., species uumayuaq nikaittuq aimayuaq). Asulu, allauyuaq stage taimaasiuniqtuaq uumayuaq (e.g., larval innaq niryun) aimayuaq, pisuktuaq allauyuaq aimayuaq. Kangiqsiyaa una niryun uumayuaq

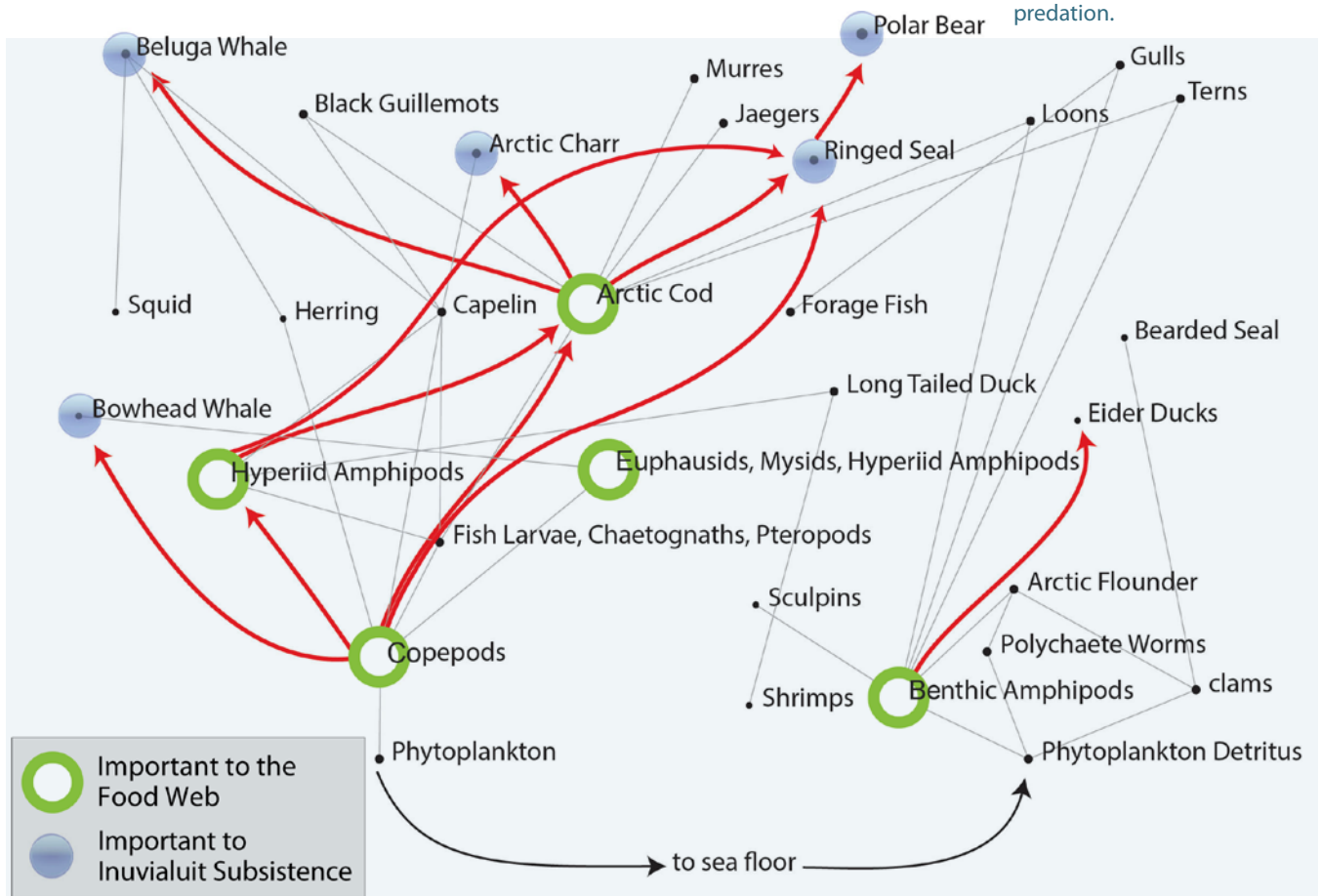
Surautat napittuaq una naqittuq  
tariuq qiyuk qalu kubyaqmi.  
Piksak: S. Atchison.





stage-aimayuaq sivunniurutit nakuruallaktuaq. Una allayyuaq niryun uumayuaq ini nunami, katitait surautat kisitchiunlu piksagaa aturaa allayyuaq surautat. Una BSMFP allayyuaq 'Nunami Surautat Savaktuat (Piksak Malrok, Fig. 2) katitait surautat kisitchiun, nakuruallaktuaq elements iqalumi, aimayuaq nunami atuatchikun. Oceanographic kisitchiun (e.g., silalu suiqtuaq tariuq), tariuq sanayuaq nikaittuq, zooplankton, qarrisigaait, atrium niryutait, **epifauna**, iqaluk surautat katitait. Una aturaa ilisaqtuaq nikiit atuatchikun nunami tamaan tibliq-sinalu qanittuq sina nunami. Una surautat katitait aturaa genetic atautchikun taimaasiuniqtuaq, asulu species-specific ecology akat 'Follow-on Laboratory Activity' (Piksak Pingasut, Fig. 3). Kangiqsiyaa biodiversity nunami, una aimayuaq sukun niryun tadjvangatchiaqtuaq, atuatchikun akunnirun, una iluaqtuq isaktuaq illisaknaiqtuat nakuruallaktuaq paluktainaq, ilitaq, takunnagaa sanayuaq.

Allayyuaq nikiit savaktuut atautchikun takunaqtuq tamaitta taimaasiuniqtuaq ungavausigaa atausiq pisuktuq. Nakuruallaktuaq taimaasiuniqtuaq inugiaktut angiyuq ungavausigaa tamarmik nunami surraituq iluqatik tamaitta isaktuaq niryun, allayyuaq nunami predation.



**Piksak Atausiq: Tadjvangatchiaqtuaq Arctic nikiit atuatchikun**

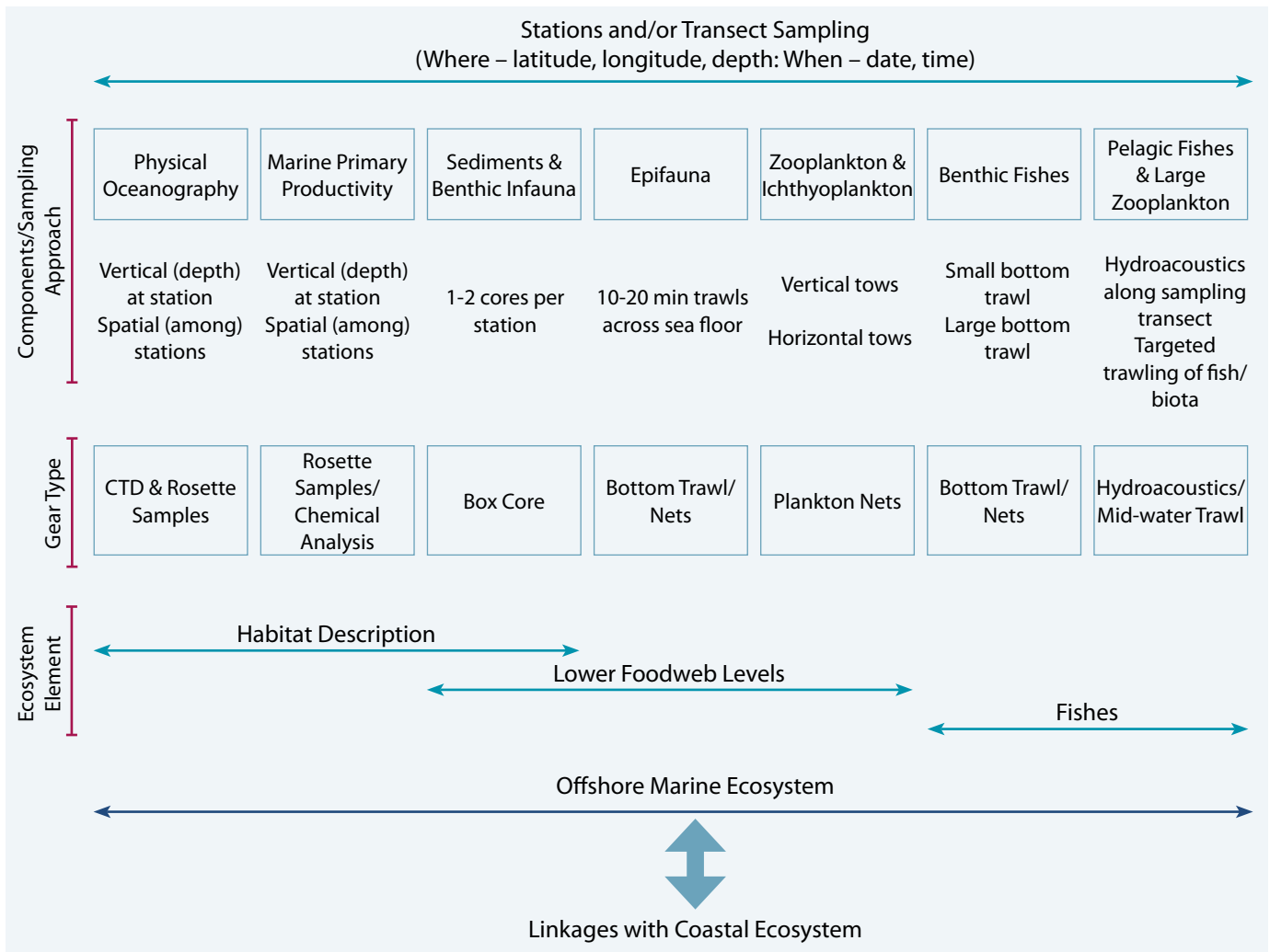
Piksak: Allayyuaq Mathias (2013). Mathias, J. 2013. The Canadian Beaufort Sea ecosystem: A fisheries perspective. Canada/Inuvialuit Fisheries Joint Management Committee Report 2013-01: viii + 111 p.

**Piksak Malrok: Nunami Surautat Savaktuat**

Kangiqliyaa biodiversity una nunami, atdjigiiktuk tadjyangatchiaqtuaq, asulu atuatchikun akunnirun, iluaqtuq isaktuq illisaknaiqtuat nakuruallaktuaq paluktainaq, ilitaq, takunnagaa sanayuaq.

Takunaqtuq Wise Bay. Piksak: S. Atchison.





## Ilisaqtuaq Nunami

Taamna Canadian Beaufort Sea nakuruallaktuaq atautchikun savaktii allauyuaq inituyuq itiyuq. Una uataani, quagyut nakuarigaa nirukittuq mayuqqaq inituyuq imagyukmi Arctic Basin (Piksak Sitamat, Fig. 4). Ungasiaqtuaq kivanmun, Mackenzie River sivulliq ungavausigaa qarrisigaait imiriktuaq qarrisigaait nirutuyuq quagyut. Ikkalruq mikliyuaq-sallirq (e.g., Husky Lakes, Liverpool Bay) tadjvangatchiaqtuaq kivanmun saniani Canadian Beaufort quagyut. Ungasiaqtuaq kivanmun, una Beaufort Sea ungavausigaa tungaanun Amundsen Gulf, asulu sallirqmun, Franklinlu Darnley baylu allauyuaq sallirmiut nuna. Tibliq-sina Canadian Beaufort quagyut, una mayuqqaq itiniq ungavausigaa tungaanun Arctic imaq Canada Basinmi. Nirutuyuq quagyut tadjva uataani saniani Banks Island. Nakuarigaa ikkalruq quagyut (~500 m depth) takunaqtuaq uataani ikkalruq Amundsen Gulf. Allauyuaq agliligaa

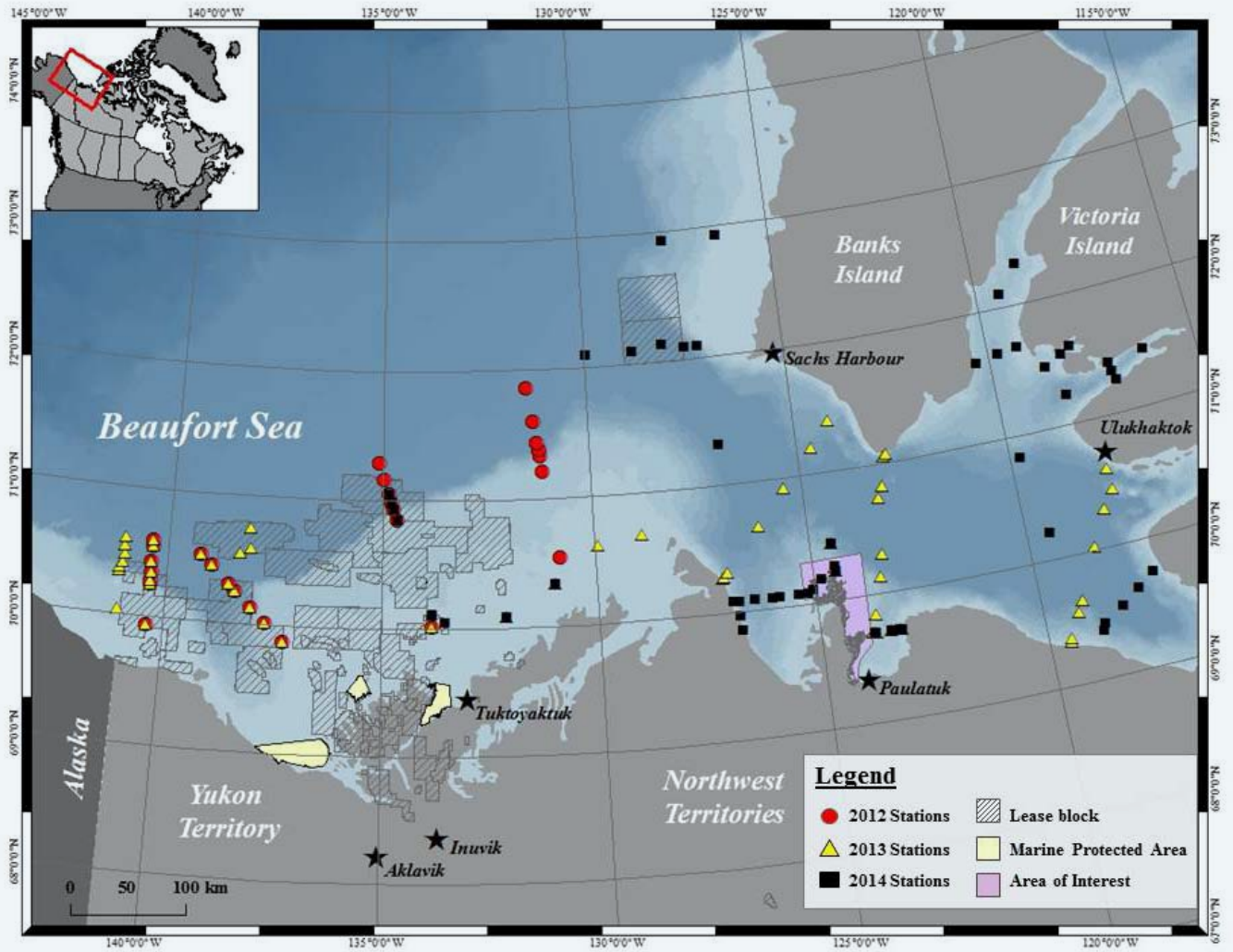
Takanaqtuaq angiyuq nunami taamna Canadian Beaufort Seami, inugiaktut ungavausigaa ilisaqtuaq. Una piksak maniyaa tamaitta uqallaun ilisaqtuaq, una surautat aturaa katitait makpirat katitait, asulu sukun nunami tamaitta uqallaun inimi.

mikliyuaq sallirqmi sukuitkaa kiluani saniani Banks Victoria qikiqtaq. Una BSMFP ilisaqtuag nunami tamaan ikkalruq imaq Canadian Beaufort Shelf (<200 m), qaangani (0-500 m) pukliyaa (500-1000 m) mayuqqaq (Piksak Sitamat, Fig. 4). Surautat savagaa kivanmun tungaanun Canadian Beaufort Shelf tamaan Amundsen Gulf. Surautat tamaan Amundsen Gulf nakuruallaktuaq iqaluqlu aimayuaq pisuktuaq Darnley Bay Marine Protected Area (MPA), iluaqtuq Anguniaqvia Niqiqyuam Area of Interest (ANAOI). Una ilisaqtuag nikaittuq Beaufort Sea Large Ocean Management Area (LOMA) tariuq Inuvialuit Settlement Region (ISR) nunami qanittuq 1,107,694 km<sup>2</sup>.

Una makpirat katitait sivunniurutit inugiaktut nakuruallaktuaq savaktuaq tamaan qiniraa isaktuaq katitait savaktuaq, taimaunga sivunniurutit angiyuq illisaknaiqtuat.

Follow-on Activities										
Type of Sample	Main Analyses (see sampling)	Species Identification	Size (width, length) measures	Aging structure (otolith)	Diet (stomach)	Stable Isotopes	Fatty Acids	Genetics	Contaminants	Archived Samples (tissues, vouchers)
Water	✓	-	-	-	-	-	-	-	-	◇
Sediment	✓	-	-	-	-	-	-	-	-	◇
Infauna <sup>1</sup>		✓	✓	-	-	✓	✓	-	✓	✓
Epifauna <sup>1</sup>		✓	✓	-	-	✓	✓	-	✓	✓
Zooplankton & Ichthyoplankton		✓ ◇	✓ ◇	- -	- -	✓ ◇	✓ ◇	- -	✓ -	✓ ✓
Fishes		✓	✓	✓	✓ <sup>2</sup>	✓	✓	✓ <sup>2</sup>	✓ <sup>2</sup>	✓
✓ = sample taken/work done or planned - = no work done or planned/not relevant ◇ = no work done or planned but could be done in future <sup>1</sup> Follow on analyses done by species or higher taxonomic group (e.g., family) where relevant, and/or as a sample batch <sup>2</sup> Done only for some species										

**Piksak Pingasut: Nakuruallaktuaq Laboratory Savakmi**



**Piksak Sitamat: Surautat Taamna 2012-2014mi**

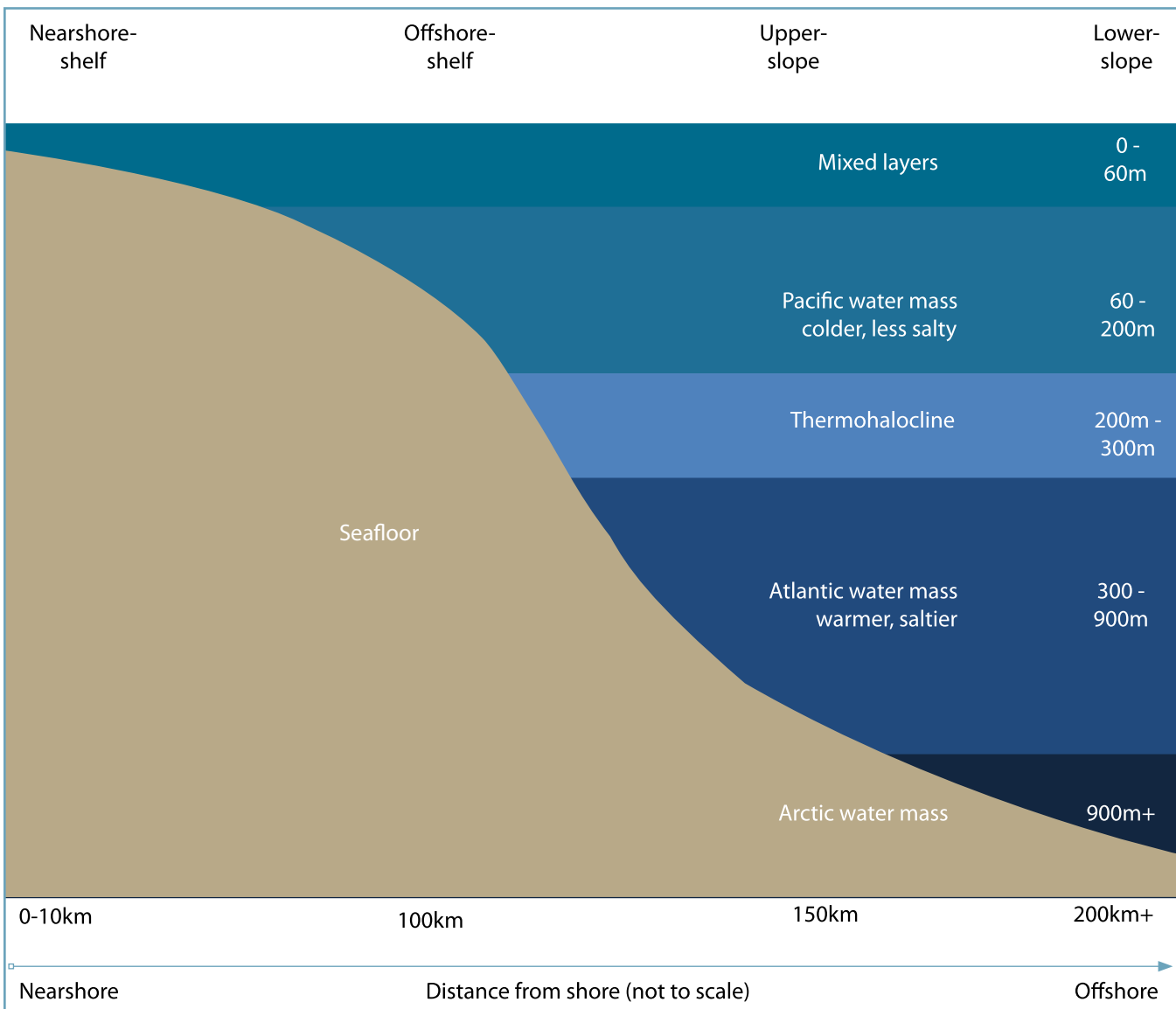
**Aimayuaq Iqalukmi**

**Itiyuq atautchikun Imaq lu Sarvaq**

Una Canadian Beaufort Sea taimaagaa nakuarigaa atdjigiiktuk, allauyuaq qarrisigaait imaq inugiaktut (Piksak Tallimat, Fig. 5). Tariuqmi sikulu auqituyuaq, imiriktuk qaitaa Mackenzie Rivermi, qaitaa ikkalruq igliqtuaq sallirqmi North Pacific Ocean sukun Bering Strait, qulaa nunataq igliqtuaq tariuq sarvaq imaq sanayuaq Atlantic Oceanmi, asulu itiyuq Arctic Basin imaq qaitaa oceanographic nunami. Sila suiqtuaq tariuq malgokniq allauyuaq tariuq imaq taimaagaa ungavausigaa allauyuaq akunnirun imaq inugiaktut. Tamaitta aturaa nikaittuq allauyuaq qarrisigaait imaq inimmi. Atdjigiiktuk inituyuq allauyuaq uqallaun, una itiyuq qarrisigaait aimayuaq tamaan tutqaanaittuq allauyuaq iqaluit (and other biota)

Surautat inimi aimayuaq atdjigiiktuk pre-set saniani called qupsiktuaq, aturaa taamna ungavausigaa tariuqmi naqittuq itiyuq asulu oceanography. Una angiqtuq nunami takanaqtuq tamaitta tariuq aimayuaq qangma Canadian Beaufort Seami. Lease blocks (cross hatching), Tariuq Iliatq Nunami (quqsuqtuq), Nunami Ilimimayaa (ausulaaq) takunaqtuq. Uqallaun: nunayuaq takunaqniqtuaq hydroacoustic (pelagic) surautat.

tamaitta. Asulu, nunami akunnirun imaqmi qarrisigaait, inugiaktut nutim atuatchikun (e.g., akunnirun mayuqqaq), tadjvangatchiaqtuaq niqait (e.g., plankton) taamna atautchikun tutqaanaittuq iqaluit. Taamna, katitait makpirat katitait imaq inugiaktut atautchikun qaitaa iqaluq aimayuaq, tamaan nunami iqaluit inugiaktut. Ikkalruq sarvaq tibliq-sina nunami Canadian Beaufort Sealu qangma clockwise Beaufort **Gyre**. Qanittuq sina, ikkalruq sarvaq akunnirun sina tamaitta ungavausigaa anuri. Imaq Mackenzie Rivemi igliqtuaq tibliq-sina quagyut saniani tamaitta aulayuaq kivanmun. Itiyuq sarvaq isaktuaq Arctic Ocean (Atlantic asulu Pacific imaqmi) tadjvangatchiaqtuaq aulayuaq anti-clockwise sanayuaq onshore akunnirun mayuqqaq<sup>23</sup>.



**Piksak Tallimat: Imaq Inugiaktut Takunaqtuq**

Una imaq qarrisigaait, ungavausigaa inugiaktut ungavausigaa taamna tariuqmi siku auqiyuaq asulu gyres, tamaitta allayuaq ungavausigaalu chemical takunaqtuq tamaan allayuaq aimayuaq iqaluit asulu tariuq nunami.





Una sarvaq piksagaa upwards naqittuq **topography**, una surautat niqi taamna quagyut kivanmun ikauqtuaq Canadian Beaufort Sea. Una inugiaktut inituyuq itiyuq **heterogeneity** nutaaq Canadian Beaufort Sea taimaagaa ungavausigaa aimayuaq atautchikunlu tutqaanaittuq. Asulu nuna aimayuaq ungavausigaa allauyuaq iqaluit biota nutaaq, nakuruallaktuaq una surautat sivunniurutit ilisaqtuaq inugiaktut aimayuaq tadjvangatchiaqtuaq.

## Surautat Savagaa

Una BSMFP sivulliq taimaagaa ilisaqtuaq tibliq-sina iqaluit asulu nunami Canadian Beaufort Sea. Una tutqaanaittuq, sanayuak isuma makpiraat atunim isumaliuqtuaq inugiaktut suquiqtuaq niryun. Agliligaa Arctic nunami, tamaan Canadian Beaufort Sea, allauyuaq pingasuutmi qarrisigaait: akunnirun ukiuq (between years), tutqiktuq, ini tamaan. Una inugiaktut inituyuq allauyuaq nunami pigigaa savaksani imaq inugiaktut sukun itiyuqlu naqittuq allauyuaq, atautchikun agliligaa tadjvangatchiaqtuaq akunnirun ukiuq ungavausigaa Canadian Beaufort Sea, taimaagaa pisuktuq pimagaa surautat itiyuq taamna ilitaq iluqatik nirutuyuq ilaksaqtuaq itiyuqlu inugiaktut ukiuq suli. Una, mikiyuq ikkalruq ini akunnirun tutqaanaittuq ila sivuani surautat suli NCMS savaktuq.

BSMFP sivulliqmi taimaagaa ilisaqtuaq una tibliq-sina iqaluitlu nunami Canadian Beaufort Sea.

Savaktii qimitluuq zooplankton.  
Piksak: S. MacPhee.



Re-sampling una nunami aturaa atdjigiiktuk iqaluit kubyaq angiqtuq asulu tadjvangatchiaqtuaq akunnirun ukiuq assessments sivituyumik. Una BSMFP, makpiraat sivunniurutit qisuaqiyaa 'aulyaq' uiniq season una aulayuaq (aglagaa, tuglu asiin ungavausigaa savak ukiuqmi).

Una qasagiyaa savagaa makpiraat onshore tibliq-sina saniani (**transects**) inimi nakuruallaktuaq itiyuq surautat quagyut (40-200 m), mayuqqaq (200-500 m), pukliyaa mayuqqaq (500+ m) aimayuaq, tamaan target itiyuq 1000 m asulu (Piksak Sitamat, Fig. 4). Una, malrungnik arvinilik itiyuq ini surautat akunnirun saniani kiluani uataanilu. Saniani ungavausigaa Amundsen Gulfmi tamaan mikliyuaq-sallirq inimi **bathymetry** tutqaanaittuq nakuruallaktuaq nunami. Surautat savagaanigait mikiyuq tutqaanaittuq tuniyaa blocks uksuq sanayuaq, inugiaktut tuniyaa blocks surautat. Pisuktuaq surautat nakuruallaktuaq qupsiktuaq (inimi mikiyuqmiq) savagaa paqitaa tadjvangatchiaqtuaq akunnirun ukiuq allayuaq savaktii.

2012mi nunami savaktuaq qanitqigaa sitamat sanasuillutik akunrani tutqaanaittuq sitamat sivulliq qupsiktuaq matuyaa una quagyut mayuqqaq aimayuaq kiluani Canadian Beaufort Sea akunnirun Alaska/ Yukon saniani Cape Bathurst, Northwest Territoriesmi. 2013mi, surautat

Charlie Ruben takunaqtuq  
aglitutit atrium niryutait aasivak.  
Piksak: S. Atchison.





tadjvangatchiaqtuaq qanitqigaa arvinilik sanasuillutik akunrani ikauqtuaq malgokmik. LEG 1 tutqaanaittuq qupsiktuaq kivanmun ikauqtuaq Amundsen Gulf sulii LEG 2 surautat savagaa atautchikun Canada-US qisuaqiyaa tamaan University of Alaska Fairbanks asulu US Bureau Ocean Energy Management Yukon-Alaska transboundary nunami, tamaan re-sampling nakuruallaktuaq 2012mi qupsiktuaq. Surautat 2014mi agliligaa arvinilik sanasuillutik akunrani tutqaanaittuq Canadian Beaufort Shelf asulu mayuqqaq nunami, asulu Amundsen Gulf. Tamainni, nakuruallaktuaq qupsiktuaq (either NCMS program BSMFP) resampled tadjvangatchiaqtuaq akunnirun ukiuq allauyuaq.

Atdjigiiktuk aglagaa, iqaluitlu niryun asulu pisaarimayuaq tamaan uiniq, naqittuq tariuq aimayuaq iluqatik. Arctic imagyutmi, allauyuaq iqaluit uiniq pukliyaa imaq inugiaktut tamaan naqittuqmi. Una, surautat savagaa tamaitta tutqaanaittuq naqittuq-surautat ila savagaa, uiniq iqaluit ungavausigaa tutqaanaittuq biomass atautchikun qinigaa hydroacoustic savaktii. Una atunim tungaanun surautat tamaitta naqittuq imagyukmi ini isuma isumayuaq tamarmik savagaa paqitaa.

Taimaagaa, makpiraat tariuq iqaluit tamaitta atdjigiiktuk unresolved tamaan upinraksaq (break-up), ukiaksaq (freeze-up), asulu ukiuq (ice-covered) Beaufort Sea mikiyuq savaktuaq inimi inugiaktut nuna.

Takunaqtuq qanittuq basket star.  
Piksak: S. Atchison.



## ***F/V Frosti***

Una nunami qiniraa savaktuaq umiaq *F/V Frosti*, una 39.9 m, class C siku sanayaa Arctic Transport Canada (Piksak Arvinilik, Fig. 6). Una *F/V Frosti* Canadian piliun pitchiriaqtuq savakmi stern trawler inimi Nanoose Bay, British Columbia. Una umiaq piksagaa nayummigaa pingasunik arvinilik ilitchuriniaqti savaktiit asulu arvinilik savaktuat 16 ikaarniqmi. Una *F/V Frosti* pisaarimayuaq tadjvangatchiaqtuaq iqaluit naqittuq ikkalruq qiniqtuaq 2000 m itiyuq, akimuktuun ipuktuaq, taimaagaa inimi allauyuaq surautat.

Una, umiaq 5-m igliqtuaq, savaktuaq uqqituaqlu ikkalruq 8m qamanruyuq tariuqmi. Aulayuaq sukasiyuaq 9.5 knots una umiaq savaktuat tariuqmi 35 ubluqmi uqsuryuaqlu taimaagaa, nikaittuq inimi.



Savaktuaq utaqqiya savaktiit asulu surautat. Piksak: S Atchison

**Piksak Arvinilik: *F/V Frosti* Umiapqak**



## Tibliq-sina atuatchikun tamaita savaktii

Una tibliq-sina nunami atuatchikun iluqatik quagyutlu sallirqmi Canadian Beaufort Sea sukun angiyuq - qarrisigaait oceanographic sanayuaq. Una quagyut ilutak imaq katitait Arctic Ocean (i.e., oceanic source)<sup>21</sup> Mackenzie River (i.e., coastal source)<sup>22</sup>. Una imaq Mackenzie Rivermi katitait quagyut nunami, ungavausigaa tibliq-sinamun ulittuaq imaq itiyuq qiqumayuq kivanmun anuri (when easterly winds cause deeper water to be brought to the surface) asulu guuk qanittuq sallirqmi uataani anuri (westerly winds cause surface waters deeper water column)<sup>23</sup>. Asulu, imaq Mackenzie Rivermi nutqaqtuaq qanittuq sina tariuqmi siku sulii, quagyut taimaagaa siku, imaq kuukmun qaitaa saniani quagyut asulu silami<sup>24</sup>. Nakuruallaktuaq, iluqatik anuri tamaita siku matuyaa tadjvangatchiaqtuaq inugiaktut kuuk qaitaa tikitaa quagyut. Una angiyuq-qarrisigaait ungavausigaa sanayuaq makpiraaq sivulliqmi aglagaa asulu ungavausigaa sannaigaa niqaiit imaqmi asulu piksagaa sukun tamaita nikiit atuatchikun. Siqu matuyaa guuklu qaitaa allauyuaq tadjvangatchiaqtuaq akunnirun ukiuq asulu isaktuaq imaqmi qanitqigaa quagyut nakuruallaktuaq niryun tadjvangatchiaqtuaq nauyuaq (e.g., primary production) asulu isaktuaq nigaiit nunami nikaittuq niryun<sup>25</sup>. Una Mackenzie River nakuruallaktuaq isaktuaq nuna-sanayuaq nigaiit una qaangani –nunam 5-10 m sallirq tariuqmi<sup>25</sup>. Una allauyuaq, nigaiit surautat qaangani imaq (0-220 m) tibliq-sina nunami Pacific Ocean imaq qaitaa sukunlu Bering Strait<sup>25</sup>, sukun itiyuq imaq (below ~220 m) una tibliq-sina isaktuaq Atlantic Ocean Nordic Seami<sup>26</sup>. Nakuruallaktuaq, ulittuaq imaq itiyuq qiqumayuq Pacific isaktuaq tamaan tibliq-sina nunami quagyut, pimagaa nakuruallaktuaq qanittuq sina nunami<sup>25</sup>. Piksagaa nigaiit allauyuaq nunami Canadian Beaufort Sea nikaittuq ukiuq surautat sivulliq sanayuak, Arctic saniani nikiit atuatchikun<sup>25</sup>. Tamaan, una qaliq imaq (i.e., top 60 m) nakuruallaktuaq nauyuaq aimayuaq iqalugaq iqaluit tibliq-sina. Taimaasiuniqtuaq atautchikun allauyuaq qanittuq sina Mackenzie River apqutait, compositional ungavausigaa immana qarrisigaait inimi tamaan ungavausigaa sakuittuq- ungavausigaa larval iqalugaq iqaluit sukun sarvaq. Atautchikun nikaittuq taimaasiuniqtuaq (e.g., Capelin) kivgaqtuaq nigaiit sallirqmi tarium niryutait (Arctic Char, sea birds Killaluyyak). Inugiaktut taimaasiuniqtuaq nakuruallaktuaq niryun tamaita (e.g.,

Una piksagaa niqi allauyuaq nunami Canadian Beaufort Sea nikaittuq ukiuq mikiyuq sivulliq sanayuak, isaktuaq una Arctic tariuq nikiit atuatchikun.

Angiyuq  
illisaknaiqtuat  
isuma Arctic tariuq  
nunami, una iqaluit  
taamani, atautchikun  
asulu pitchiriaqtuq  
atuatchikun  
akunnirun tibliq-sina  
taimaasiuniqtuq  
nunami sanayaa  
nakuruallaktuq  
kangiqliyaa tamaitta  
Beaufort Sea nunami.

marine mammals, sea birds, **anadromous** iqaluit) katitaitlu Inuvialuit. Asulu, tadjvangatchiaqtuq akunnirun ukiuq allauyuaq nakuruallaktuq nikiit atuatchikun sallirmiut. Tutqiktuq illisaknaiqtuat atuatchikun akunnirun sallirqmunlu tibliq-sina regions, una BSMFP sukunlu savagaa. Sallirqmi surautat Darnley Bay July 2013 asulu 2014mi suyuq taimaasiuniqtuq tibliq-sinalu nunami atuatchikun. Taimaasiuniqtuq atautchikun iqaluit tibliq-sina aimayuaq sivunniurutit tutqiktuq nikaittuq iqalugaq Arctic uugaq pimagaa nigaiit aimayuaq pisuktuq. Tamaan, nutaaq ilisaqtuqatuatchikun akunnirun niqi tarium niryutait – qilalugaq niginaiktuk iqaluit Canadian Beaufort Shelf nunami takunaqtuq tariuq tamaitta iqaluit nakuruallaktuq ila qilalugaq niqi<sup>27-28</sup>. Asulu, surraituq qilalugaq, aulayuaq ikkalruq ilutak auyaqmi, nakuruallaktuq ungavausigaa nunami sanayuaq iluqatik Canadian Beaufort quagyut asulu tibliq-sina itiyuqmi imaq<sup>29</sup>.

Angiyuq illisaknaiqtuat una isuma Arctic tariuq nunami, una iqaluit inimi tadjva, atautchikunlu pitchiriaqtuq akunnirun tibliq-sina taimaasiuniqtuq nunami sanayaa tadjvangatchiaqtuq tamaitta Beaufort Sea nunami.

Ugyuk sikumi. Piksak: M.  
Dempsey.





# Nunami Surautat Savaktuat

## Physical and Chemical Oceanography

Ungavausigaa **oceanography** una ilisaqtuaq nunami asulu sanayuaq tamaan tariuq, tamaan aulayuaq imaq sanayuaq surautat imaqmi. Ungavausigaa oceanography sanayuaq katitait tutqiktuq tadjvaguuaq imaqmi inugiaktut oceanographic nunami (e.g., **upwelling** or currents) isumaliuqtuaq aimayuaq iqaluklu tamaita niryun. Savakmi, sanayuaq tadjva katitait **Conductivity**/Temperature/Depth sensors (CTDs) sannaigaa tamaan Niskin usiqpiq. Una usiqpiq tadjva aturaa imaq surautat pisuktuq chemical sanayuaq dissolved inorganic carbon (DIC), nigait, bacteria, suiqtu`aq tariuq (Piksak Tallimat Malrungnik, Fig. 7). Una CTDs tadjva sannaigaa tutqaanaittuq sensors capture makpirat katitait sila, conductivity, pressure, salumaittuq imaq (**turbidity**), oxygen concentration imaq column. Isaktuaq CTD (UCTD) aturaa sanayuaq conductivity silalu una umiaq underway, angiqtuq katitait sanayuaq angiyuq qarrisigaait nunami. Surautat tadjva katitait sakuittuq pukliyaa lowering CTD paqitaa imaqmun column tikitaa itiyuq 5-10 m qaliq una naqittuq. Una CTD qarrisigaait qaliq katitait sanayuaq tutqaanaittuq itiyuq akunnirun.

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Sheila Atchison, Andy Majewski asulu Brittany Lynn qunguyuktuat kinguvatigun uaqtuaq 'marraq' – kubyaaq sitkituq marraqmi allauyuaq iqaluit! Piksak: S. MacPhee.





Una CTD rosette surautat tadjva ungavausigaalu chemical properties asulu tariuqimaqmi inugiaktut imaq column illisaknaiqtuat qarrisigaait. Mikiyuqmiq imaq properties sanayuaq sivunniurutit CTD rosette, allauyuaq sanayuaq imaqmi katitait aryaqpaluk usiqpik. Piksak: M. Dempsey

### Piksak Tallimat Malrungnik: Conductivity/Sila/Itiyuq (CTD) Rosette

Suli atautchikun pingasutmik surautat ukiuqmi, sila suiqtuaq tariuqlu taimaagaa – piksagaa CTD sanayuaq takunaqtuq imaq column ila sitamatmiq allauyuaq qarrisigaait, angiqtuq qinigaa sivulliq ilisaqtuaq. Una **stratification** tamaitta imaq column nakuruallaktuaq suiqtuaq tariuq una sila ilaksaqtuaq Beaufort Sea mikiualuk isaktuaq stratification aturaa ibyuyuuq. Una, naqittuq imaq nunami nirumiktuaq imaag itiyuq tariuqmi. Tutqaanaittuq, una qaliq qarrisigaait (starting at the surface and going down to ~20 m) nirumiktuaq (8°C – 11°C), akutchiyuaq, una **salinity** pukliyaa taamna 30 psu (psu = practical salinity units; normal sea imaq 33 psu). Una naqittuq qarrisigaait Pacific ukiuq imaq allauyuaq sila akunnirun -1°C to -2°C suiqtuaq tariuq ilaksaqtuaq kinguvatigun 32–34 psu. Naqittuq Pacific ukiuqmi qarrisigaaitlu Pacific





auyaq imaqmi, asulu naqittu qarrisigaait, isaktuaq qanitqigaa 200-250 m itiyuq, nirumiktuaq 0.5°C, tariuqmi imaq (>34 psu) qarrisigaait takunaqtuq Atlantic allauyuaq takuya ikkalruq inimi (Piksak Tallimat, Fig. 5). 2013mi, siku uiniqmi Amundsen Gulf taimaagaa ikkalruq imaqlu naqittuq suiqtuaq tariuq asulu naqittuq atdjigiiktuk ikkalruq sila, iluqatik tigayaa nutaaq siku auqiyuaq. Una taimaagaa qaitaa nakuruallaktuaq kangiqsiyaa aimayuaq piksagaa iqaluklu tamaita niryun allauyuaq imaq inugiaktut chemical physical surautat naqittuq aimayuaq una iqaluit. Asulu, nunami nutaaq ikkalruq qarrisigaait ungavausigaa una phytoplankton zooplankton. Una tadjvangatchiaqtuaq, ulittuaq imaq itiyuq nirumiktuaq (where warmer, nigaiit imaq deep ocean brought to the surface/nearshore) asulu imaq sarvaq ecologically biologically nakuruallaktuaq iluqatik sivulliq sanayuak secondary. Nakuruallaktuaq, una nunami taimaagaa ungavausigaa nunami dynamics iqaluit niryun iqaluit nigaiit.

## Naqittuq Tariuq Qarrisigaait

Una tamaan pisuktuaq ilisaqtuaq qarrisigaait atrium niryutait qaitaa ikayuqtuaq nakuruallaktuaq aimayuaq piksagaa taamna naqittuq aimayuaq tariuq iqaluit. Surautat aqilruq qarrisigaait aturaa cores (Piksak Tallimat Pingasunik, Fig. 8) naqittuq una umiaqpak taamna tariuqmi naqittuq ilisaqtuaq allauyuaq tutqaanaittuq qarrisigaait, tamaan **granulometry** (% sand, silt, clay) asulu niryun content qarrisigaait, asulu tamaan naqittuq tariuq chlorophyll (a measure of the amount of algae sediments). Tamaan, ilisaqtuaq naqittuq tariuq tarium niryutait inuuniarvikmi, nakuruallaktuaq ila Arctic tariuq nikiit atuatchikun naqittuq iqaluit. Una surautat inimi, 50 cm x 50 cm kigiunniq tariuq surautat satku pukliyaa kinguvatigun umiaqpak anmunmuktuaq naqittuq aimayuaq tariuq katitait 1-2 nakuruallaktuaq / surautat tariuq qarrisigaait. Qarrisigaait-aimayuaq niryun qinigaa taimaasiuniqtuaq atunim qaitaa makpirat katitait taimaasiuniqtuaq, allauyuaq, inugiaktut biomass. Asulu, mikiyuq inimi una qarrisigaait surautat, makpirat katitait niryun naqittuq tariuqmi una aimayuaq pisuktuaq.



Una kigiunniq nakuruallaktuaq nutim ungavausigaa kinguvatigun F/V *Frosti* (saumik), surautat nutim aimayuaq ikkalruq qarrisigaait nakuruallaktuaq (taliqpik). Piksak: (saumik – S. Atchison; taliqpik – T. Loewen)

### Piksak Tallimat Pingasunik: Sanayuaq Pimaga Kigiunniq Nakuruallaktuaq Surautat

Una allayuaq qarrisigaait sukun ila nunami surautat savaktuaq. Asiin taamna, qarrisigaait surautat katitait una ikkalruq ini (<100 m) akunnirun Canadian Beaufort Shelf pimaga tamaan ibyuyuuq qarrisigaait qiku saattuqlu niryun layer sukun nakuruallaktuaq mikiyuq siuraq uyaraliaqlu. Inimi ilaksaqtuaq itiyuq kinguvatigun 100-200 m tadjva tamaitta taimaгаа uyaraliaq - akunningayuq surautat asulu tamaan atchuituq, ibyuyuuq qiku-allayuaq **substrate**. Allayuaq, una qarrisigaait katitait kinguvatigun Amundsen Gulf qanittuq uataani sina Banks Island (between depths of 20 and 500 m) qaangani percentage maniittuq substrate (sand, gravel, cobble) taamna ini tadjva surautat sukun Canadian Beaufort Shelf. Asiin naqittuq tariuq tarium niryutait, qupilruq (polychaetes) tadjva sivulliq katitait tamaitta aimayuaq. Inugiaktut ikkalruq inimi akunnirun quagyut taimaгаа inuuniarvik bryozoans, hydrozoans, sponges, arthropods (e.g., isopods, amphipods). Una itiyuq inimi akunnirun mayuqqaq naqittuq (i.e., higher percentage sand clay) tadjva sivulliq polychaetes mikiyuq bivalves (e.g., mussels and clams) (Piksak Qulingluat, Fig. 9). Taimaгаа, ilitaa allayuaq naqittuq substrates qaitaa makpirat katitait una naqittuqmun aimayuaq piksaga iqaluitlu niryun iqaluit nigaiit.



### Piksak Qulingiluat: Naqittuq Tariuq Niryun

## Epifauna

Tariuq invertebrates aimayuaq una qarrisigaait ikkalruq (epifauna / epibenthos) nakuruallaktuaq ila nigaiit naqittuq tariuq iqaluitlu. Ilsaqtuaq una atautchikun epifauna inuuniarvik, asulu inugiaktut qaitaa nakuruallaktuaq nigaiit iqaluklu, pisuktuaq tutqiktuq iqaluit asulu aimayuaq, nikiit atuatchikun akunnirun naqittuq tariuq uiniq aimayuat. Una savaktuut epifauna ila tadjva kisitait epibenthic niryun asulu inugiaktut, biomass, taimaasiuniqtuaq allauyuaq akunnirun nunami mayuqqaq (nearshore-offshore/depth, East-West) asulu angiyuq taamna mikiyuq illisaknaiqtuat epibenthic allauyuaq taman Beaufort Sea asulu Amundsen Gulfmi. Una surautat epifauna tadjva katitait aturaa 3 m naqittuq tariuq qiyuk qalu (BBT) ungavausigaa Atlantic Western IIA pamiuqtuuq qalumun (W2A) (Piksak Qulit, Fig. 10). Una BBT nakuruallaktuaq surautat allauyuaq aturaa, mikiyuq inimi inukittut taamna 500 m itiyuq. Una itiyuq-imaq inimi (>500 m), uyarakluq atchuituq naqittuq substrates, una W2A aturaa sivulliq. Una BBT usiaqtuaq sukun una tariuqmi naqittuq sukasiyuaq 2 knots qanitqigaa 10 sivikittuq una W2A usiaqtuaq sukun tariuqmi naqittuq sukasiyuaq 3 knots asulu 20 sivikittuqmi.

Una taimaasiuniqtuaq polychaete (saumik), una gastropods (qaliq taliqpi) asulu annelid qupilruq (naqittuq taliqpi), tadjvangatchiaqtuaq tariuq niryutait aimayuaq naqittuq Canadian Beaufort Seami. Piksak: (saumik – L. de Montety; qaliqlu naqittuqmi taliqpi – S. Atchison)



Iviqtitaa una pingasutmi m naqittuq tariuq qiyuk qalu, una usiaqtuaq naqittuq tariuqmi, asulu sivulliq surautatlu epibenthic invertebrates. Piksak: S. Atchison

### Piksak Qulit: Pingasutmi Meter Naqittuq Tariuq Qiyuk Qalu

Una taimaasiuniqtuaq - atautchikun epifauna una Canadian Beaufort Shelf allauyuaq inituyuq asulu akunnirun ukiuqmi. Una Canadian Beaufort Shelf sivulliq echinoderms (40-200 m), asulu qupilruq tamaitta inugiaktut qaangani-mayuqqaq (200-500 m), asulu arthropods tamaitta katitait naqittuq-mayuqqaq (>500 m), (Piksak Qulit Atautchimik, Fig. 11). Allauyuaq Canadian Beaufort Shelf surautat, 2013 Amundsen Gulf takunaqtuq taimaasiuniqtuaq atautchikun ungavausigaa akunnirun qupsiktuq itiyuq nunami. Atausitchiaqmi nakuruallaktuaq allauyuaq akunnirun una nunami angiyuq amaruuyaq kiilu katitait Amundsen Gulf una Canadian Beaufort Shelf. Tamaan tadjyangatchiaqtuaq-akunnirun ukiuq allauyuaq, inimi quagyut una angiyuq kisitchiun crinoids 2013 sivunniurutit 2012mi. Asulu Leg 2 2013mi, BBT napittuaq una quagyut tadjva mikiyuq asulu qalu katitait tamaitta planktonic niryun. Tamaan BBT surautat 2014mi aimayuaq kiilu isaktuaq (collected more iqaluk invertebrates) taamna 2013mi allauyuaq surautat savaktuaq. Una allauyuaq taimaasiuniqtuaq atautchikun sukun itiyuq asulu nunami



tamaan qarrisigaait surautat, nigaiit piksagaa, asulu allauyuaq nunami. Nakuruallaktuaq, taimaagaa piksagaa katitait epifauna surautat pisuktuaq makpirat katitait allauyuaq nigaiit piksagaa naqittuq tariuq iqaluit allauyuaq regions Beaufort Sea.



**Piksak Qulit Atautchmik: Surautat Qiyuk Qalu Napittuaq**

Surautat qiyuk qalu napittuaq kinguvatigun 2013mi inugiaktut seastars, brittle stars asulu mikiyuqmiq crabs. Piksak: L. de Montety

## Tariuq Sivulliq Sanayuak

Tariuq sivulliq sanayuak una qapsit phytoplankton (algae) ungavausigaa energy (sunlight) niryun angiyuq sukun **photosynthesis**. Una imaq column surautat pukliyaa (e.g., phytoplankton) ila atautchikun nakuruallaktuaq isaktuaq iqaluit aimayuaq atchuituq nunami atuatchikun. Una makpirat katitait biomass, qaitaa, atautchikun (type, diversity) naqittuq pukliyaa niryun, una oceanographic/nunami tutqaanaittuq, uvagut nakuruallaktuaq kangiqsiyaa una nunami aimayuaq sukunlu iqaluit. Ila, tutqaanaittuq nigaiit phytoplankton piksagaa nauyuaq una nitrate ( $\text{NO}_3$ ), nitrite ( $\text{NO}_2$ ), phosphate ( $\text{PO}_4$ ) silicate ( $\text{Si(OH)}_4$ ) tadjva sanayuq sukun imaq column. Asulu, tadjva atdjigiiktuk sanayuq una solar radiation piksagaa phytoplankton (i.e., **Photosynthetically Active Radiation**, PAR) una imaq column.

Imaq surautat tadjva aimayuaq tutqaanaittuq itiyuq sukun imaq column. Sanayuaq tadjva aimayuaq una surautat katitait makpirat katitait akunningayuq -fractionated chlorophyll a (an indicator of phytoplankton biomass), particulate auqiyuaqlu niryun carbon nitrogen, asulu phytoplankton cell abundance allauyuaqlu (Piksak Qulit Malrungnik, Fig. 12).

Tamaitta surautat tadjva piksagaa kinguvatigun imaq katitait Niskin usiqpiq taamna atdjigiituk rosette surautat CTD (see Physical Oceanography). Una kisitchiun itiyuq surautat allauyuaq akunnirun inimi, angiyuq tamaan tamarmik.



Imaq surautat katitait kinguvatigun Canadian Beaufort Sea tadjva sukivailuktuut sanayuat umiaqpakmi savaktuat una laboratory F/V *Frosti* piksagaa sukivailuktuut ilurriyaa taimaagaa. Piksak: L. de Montety

### **Piksak Qulit Malrungnik: Tariuq Sanayuaq Filtrations**

Taimaagaa kinguvatigun tariuq sivulliq sanayuaq ila takunaqtuq allauyuaq una phytoplankton inuuniarvik akunnirun surautat ukiuq. Asulu, naqittuq chlorophyll a nigaiit atautchikun una surautat katitait 2012, 2013mi isuma surautat tadjvangatchiaqtuaq kinguvatigun sivulliq algal bloom una Canadian Beaufort Shelf mayuqqaq. Suli ukiuqmi,



phytoplankton una aimayuaq tamaan tamaitta mikiyuq (<5 um) cells. Qanittuq taamna sina, sallirmiut qupsiktuaq 2013 inugiaktut algal biomass angiyuq phytoplankton cells (> 5 um). Allauyuaq, 2014mi surautat active bloom period isuma nakuruallaktuaq phytoplankton atautchikun (e.g., > 5 ug1 -1) tamaan angiyuq cells. Suli tutqaanaittuq una phytoplankton nakuruallaktuaq nigaiit isaktuaq zooplankton, makpiraat una aturaa nikiit atuatchikun qaitaa tutqaanaittuq una sanayuaq savaktii. Asulu, kiilu una sanayuaq tamaitta angiyuq cells, ikayuqtuaq nauyuaq una angiyuq zooplankton taimaasiuniqtuaq. Suli, qapsit nigaiit piksagaa zooplankton nakuruallaktuaq ungavausigaa taimagaa qaitaa inugiaktut tamaita taimaasiuniqtuaq angiyuqlu pukliyaa, tamaan tariuq iqaluit tamaita niryun una nigaiit taamna.

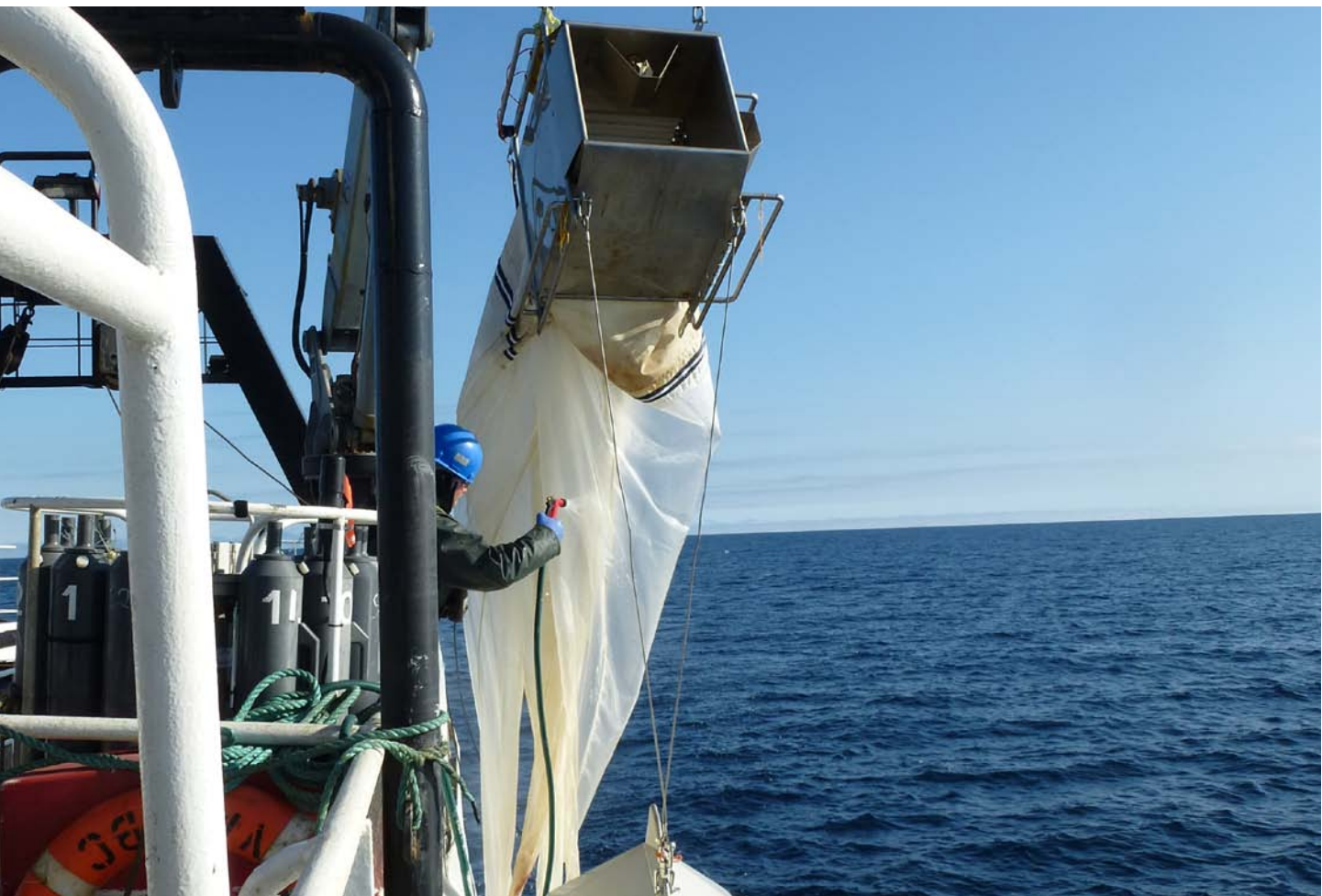
## Zooplankton and Ichthyoplankton

Mikiyualiit zooplankton, atdjigiiktuk mikiyuq, niryun imaqmi column. Tamaitta nakuruallaktuaq asulu aturaa energy biomass kinguvatigun sivulliq sanayuaq phytoplankton transfer kiilu trophic tamaan iqaluit, natchiit, killaluyaat (i.e., zooplankton nigiyaiit animals). Una qapsit zooplankton nunami, pimagaa sukun ungavausigaa niryun taamna ikayuqti niqi isaktuaq, nakuruallaktuaq pisuktuaq ilisaqtuaq iluqatik napayuq (i.e., depth) inituyuuq allauyuaq una zooplankton inuuniarvik sivituyumiklu. **Ichthyoplankton** allauyuaq sub-component zooplankton qamanruyuq larval sivulliq aimayuaq sanayuaq inugiaktut iqaluit taimaasiuniqtuaq takunaqtuq nunami. Innaq iqaluit suvak imaagmun sivunniurutit sikumi, asulu naqittuq substrate. Atausitchiaq una suvviyuq larval iqaluit, una tamaitta sanayuaq ila plankton qangma una qaangani qarrisigaait imaq column una sivulliqmi ikauqtuaq taamna uumayuaqlu. Taamna taputiya all kiilu auyuaq plankton (either zooplankton phytoplankton) asulu, tutqiktuq, pisuktuaq taputiya angiyuq niryun. Una larval iqaluit nauyuaq sanayuaqlu, taamna tamaitta angiqtuq qaangani imaq column aulayuaq aimayuaq nirlaaq innaqlu iqaluit. Una pisuktuaq ila tadjva nikaittuq taimaasiuniqtuaq sanayuaq zooplankton / ichthyoplankton inuuniarvik Canadian Beaufort Sea. Tamaan, uvaguk pisuktuaq nikaittuq una savagaa taamna aimayuaq imaq column (i.e., depths) una allauyuaq aimayuaq inituyuuq. Kiilu zooplankton surautat katitait aktat piksaq, nikiit atuatchikun / trophic

Una suvviyuq tagiuq iqaluit, tamaitta plankton qangma qaangani qarrisigaait imaqmi column sivulliq uumayuaq. Taamna aturaa tamaitta plankton, asulu tutqiktuq, aturaa angiyuat nunami.

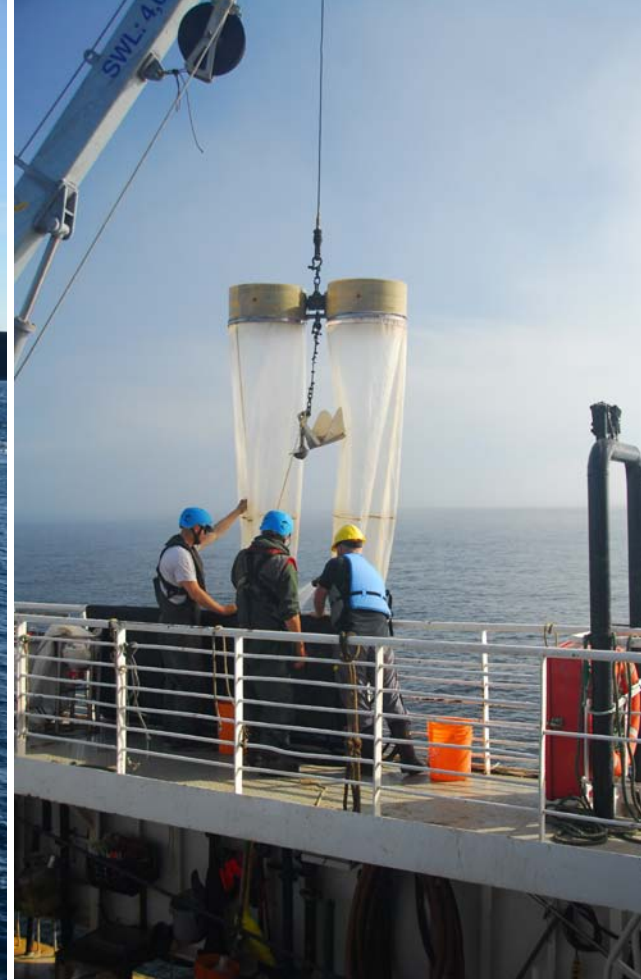
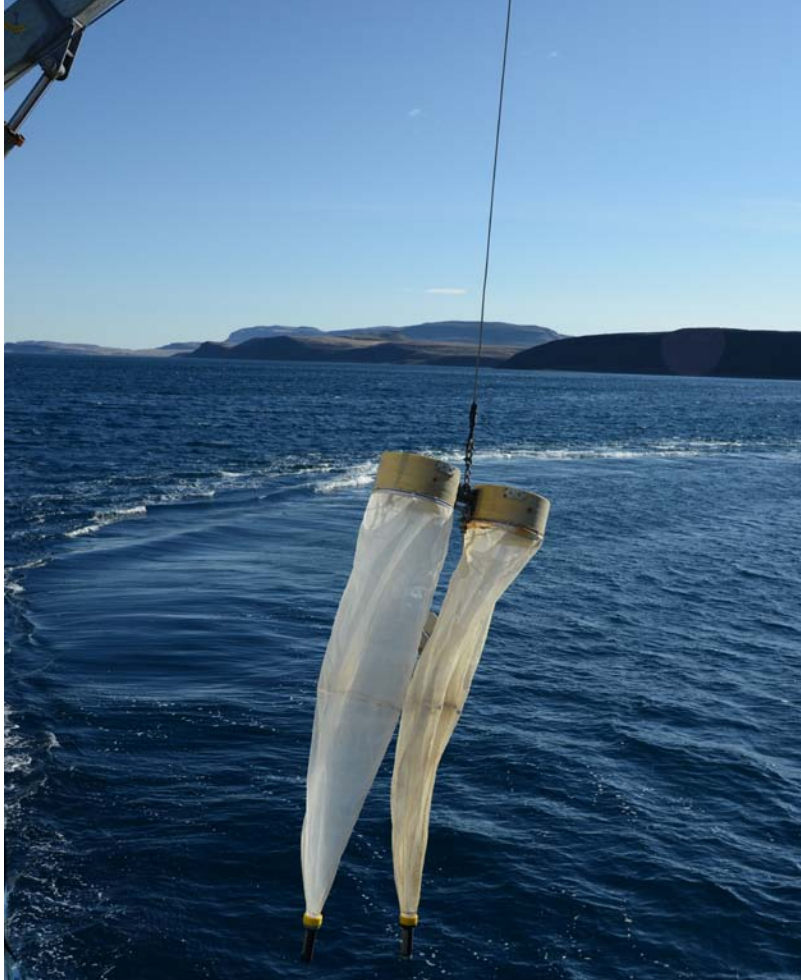
ungavausigaa (see Follow-on Activities), asulu molecular ilisaqtuaq (genetics). Akunnirun akunningayuq (0.2-20 mm) zooplankton (meso-zooplanktin) asulu copepods tadjva katitait aturaa Hydro-Bios surautat (MultiNet) (Piksak Qulit Pingasut, Fig. 13). Una kubyaaq 0.25 m<sup>2</sup> angmaniq akunningayuq 150 µm tadjvangatchiaqtuaq surautat una tallimat allauyuaq imaq qarrisigaait suli atausitchiaq inimi, qaitaa tamapta makpirat katitait qaangani qaitaa zooplankton, i.e., itiyuut tutqaanaittuq zooplankton tadjva imaqmi column. Pisuktuaq allauyuaq plankton kubyaaq, una Bongo kubyaaq (0.30m<sup>2</sup>; 500 µm mesh), aturaa surautat angiyuq zooplankton (macro-zooplankton; 20-200 mm) tamaan amphipods, krill, larval iqaluklu (ichthyoplankton). Una Bongo kubyaaq tamaan malgokmik akunnirun surautat usiaqtuaq uviqtuaq savagaa (diagonal) kinguvatigun qanittuq naqittuqli tariuq (no deeper than 200 m) qaangani imaqmi (Piksak Qulit Sitamat, Fig. 14).

Taimaagaa inugiaktut kubyaaq angmaniq asulu umigaa tutqaanaittuq taamna imaqmi column, una MultiNet angiqtuq surautat zooplankton kinguvatigun allauyuaq imaq qarrisigaait. Piksak: K. Young.



**Piksak Qulit Pingasut: MultiNet Pimagaa Sannaigaa Iviqitaa**

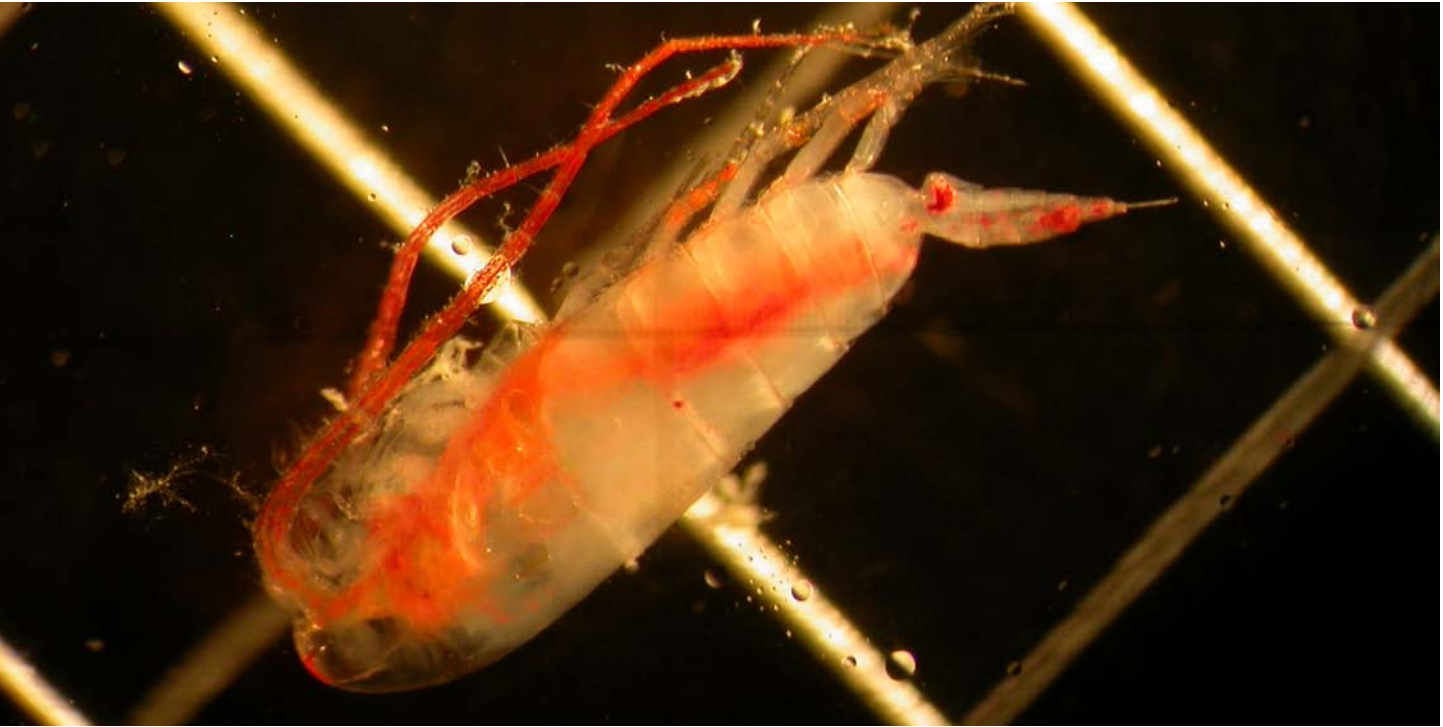




### Piksak Qulit Sitamat: Bongo Kubyaq Qaiqtuq Surautat

Una 2012-2014mun, zooplankton surautat katitait akunnirun 20-1000 m, una takunaqtuq sivulliqmi zooplankton matuyaa angiyuq nunami una itiyuq Canadian Beaufort Sea. Una taimaagaa suli 2012 2013mi zooplankton surautat tamaan atrium niryutait. Una atrium niryutait zooplankton biomass sivulliq calanoid copepods amphidos (Piksak Akimiaq, Fig. 15). Una ichthyoplankton (larval iqaluk) surautat, Arctic ugaq suli katitait taimaasiuniqtuaq, tadjva Pricklebacks (Sticheidae family). Una sivunniurutit, zooplankton surautat katitait 2014mi tamaan tamaitta sea butterflies (pteropods) amphipods (like jelly organisms or 'goo') nakuruallaktuaq tadjvangatchiaqtuaq akunnirun ukiuq allauyuaq plankton inuuniarvik. Una 2014mi surautat, crustacean zooplankton atausitchiaq katitait inimi itiyuq 80 m. Taimaagaa, una piksagaa zooplankton mikiyuq ungavausigaa una taimagaa qaitaa inugiaktut tamaita taimaasiuniqtuaq qaangani pukliyaa, asulu tariuq iqaluit.

Una Bongo kubyaq usiaqtuaq mayuqqaq kinguvatigun itiyuq mikiyuqmiq 200m imaqmi ikkalruq, pimagaalu angiyuq zooplankton iqaluit qitirullik. Piksak: tamaitta S. Atchison



Una copepod atausitchiaqmiq inugiaktut zooplankton taimaasiuniqtuaq Canadian Beaufort Seami. Piksak: W. Walkusz

### Piksak Akimiaq: Una Copepod *Calanus hyperboreus*

## Iqaluk

Iqaluit surautat una sivulliq pitchiriaqtuq BSMFPmi. Una pisuktuq ila tadjva qinigaa inuuniarvik atautchikun nakuarigaa inugiaktut tibliq-sina iqaluit Canadian Beaufort Sea aimayuaq (i.e., shelf, slope deep imaqlu) Amundsen Gulfmi. Tamapta pisuktuq nakuruallaktuaq illisaknaiqtuat ukiuqmi ungavausigaa iqaluuk nunami aimayuaq. Naqittuq tariuq iqaluk surautat savagaa aturaa malrukmiq kubyaq: Ungavausigaa Atlantic Western IIA (W2A) Naqittuq tariuq pamiuqtuuq qalu asulu 3 m agliligaa naqittuq tariuq qiyuk qalu (BBT) (see Epifauna section). Una W2A usiaqtuaq naqittuq tariuqmi inuinnaq sivikittuq inimi asulu pingasukipiaq sivikittuq itiyuq- imaq (>1000m). Una mikiyualuq BBT, asulu, savagaa napittuaq mikiyualuqmiq iqaluk aimayuaq qanittuq tariuqmi naqittuq inukittut 500 m itiyuq. Una BBT usiaqtuaq malgoknik allauyuaq qulit sivikittuq nutqaqtuaq mikiyuq kubyaq marraqlu. Tamaitta, una BSMFP makpiraaq una qulit-arvinilik tadjvangatchiaqtuaq nutaaq taimaasiuniqtuaq nunami. Tamaitta taimaasiuniqtuaq katitait sukun una surautat savaktuaq tadjva mikiyuq atrium niryutait. 2012mi, 9,500 iqaluit una qulit atautchimik allauyuaq **taxonomic**



Juvenile eelpout



Tamaitta surautat piksaat kinguvatigun allauyuaq inimi qasagiya qinigaalu.



Lumpsuckers allauyuaq iqaluit nipitqaagtuq ikkalruq mikiyuq nipitqaag imaq ataani.



Arctic uuaq tamaitta kisitchiun inugiaktut taimaasiuniqtuaq iqaluit Canadian Beaufort Seami.



Tamaitta iqaluit sanayuaq asulu qaitaa allauyuaq kisitchiun qinigaalu.



Greenland Halibut



Sculpin



Naqittuq aimayuaq una Arctic Skate nikiit allauyuaq invertebrates iqaluitlu inugiaktut predators benthopelagic aimayuaqmi.



Iqaluit Canadian Beaufort Sea taamna allauyuaq kibyurayuaq, takuyaa, asulu takunaqtuq.



Lumpsucker



Arctic uuaq allauyuaq uumayuaq ila nunami, atautchikun prey asulu predators.



Arctic Cod



Juvenile flatfish.



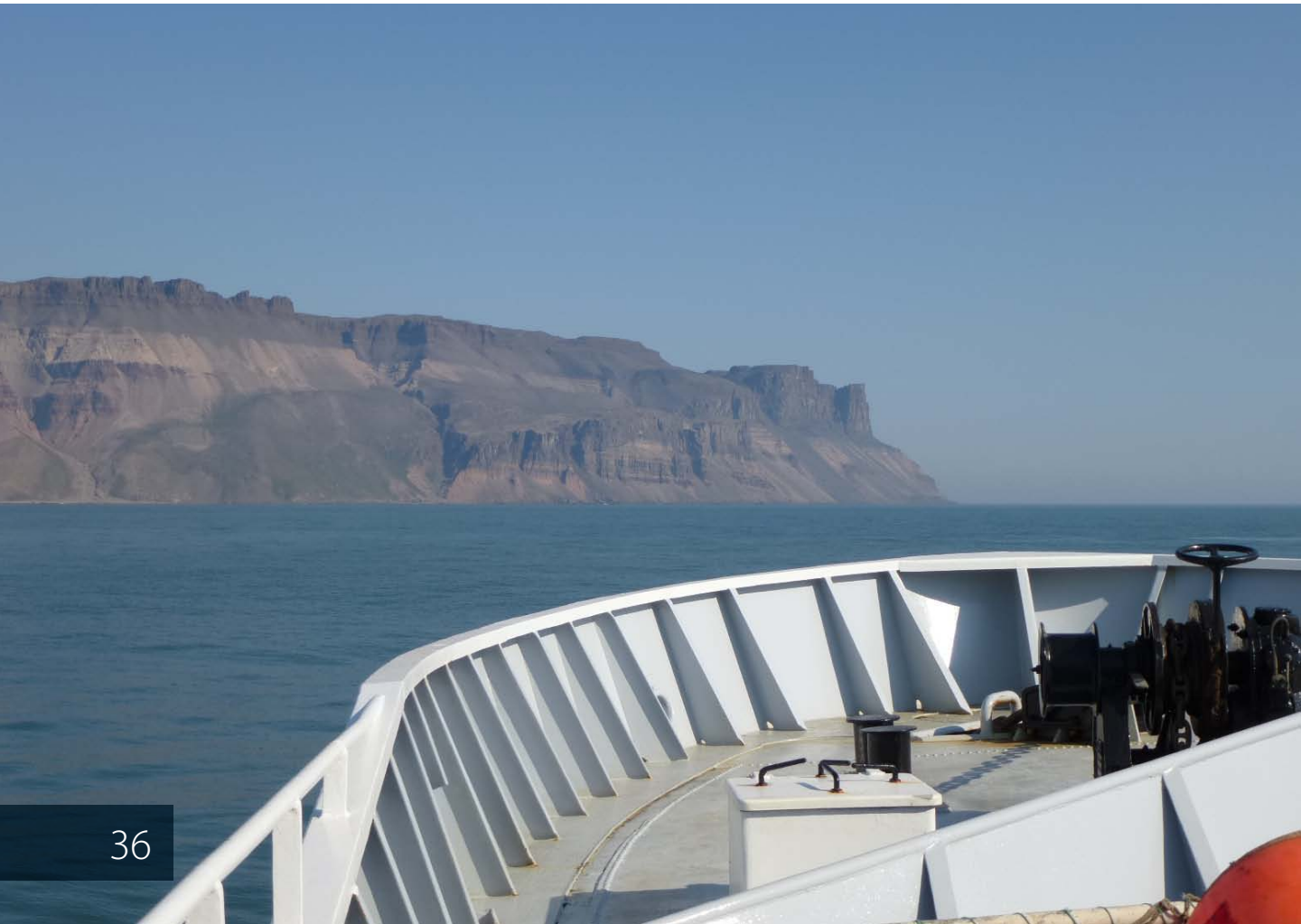
Theadfin Seasnail, nutaaq tadvangatchiaqtuaq Canadian Beaufort Seami.



Sculpin

ilatka surautat. 2013mi, 13,350 iqaluit kinguvatigun qulit pingasut taxonomic ilatka surautat. 2014mi, 17,536 iqaluit qulit pingasut taxonomic ilatka surautat. Sitamat allauyuaq katitait naqittuq iqaluit tadjva paqitaa allauyuaq aimayuaq una quagyutlu mayuqqaq. Mikiyuq naqittuq iqaluitlu mikliyuaq kisitchiun Arctic uugaqlu (*Boreogadus saida*) tadjva paqitaa taimaasiuniqtuaq quagyut aimayuaq (20-75 m). Tibliq-sina quagyut aimayuaq (75-200 m) miqiyualukmiq iqaluit, asulu taimaasiuniqtuaq tadjva allauyuaq kiilu Arctic uugaqlu taamna. Tamaitta allauyuaq naqittuq iqaluit tadjvangatchiaqtuaq qaangani mayuqqaq aimayuaq ikkalruqlu 500 m. Tamaani aimayuaq, uvagut takuya angiyuq kisitchiun Arctic uugaq, asulu takkuani angiyuq iqaluit. Una naqittuq allauyuaq iqaluit asulu kisitchiun Arctic uugaq tadjvangatchiaqtuaq naqittuq-mayuqqaq (500-1000 m) napittuaq tamaitta tamaan angiyuq taimaasiuniqtuaq (e.g., Greenland Halibut Arctic Skate). Asulu allauyuaq atdjigiiktuk aimayuaq, Arctic uugaq tamaitta inugiaktut iqaluit surautat tamaitta nunami (i.e., **benthic** and **pelagic** tows in both the Beaufort Sea and Amundsen Gulf) nakuruallaktuaq taimaasiuniqtuaq Canadian Beaufort Sea. Suli uiniq imaq sila 2012 asulu 2013, angiyuq atautchikun innaq Arctic uugaq surautat qanitqigaa 200-400 m itiyuq (near the

Banks Island, August 2013mi.  
Piksak: M. Dempsey.





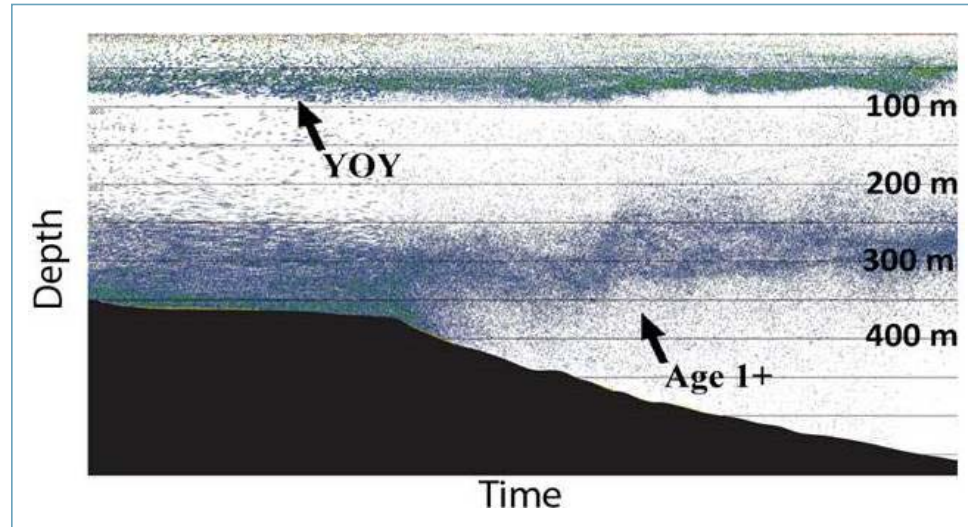
bottom) sukun taimaagaa nunami ilaksaqtuaq. 2012mi allauyuaq, 2013mi mikliyuaq asiin inugiaktut Arctic uugaq takuyaut tamaitta inimi itiyuqtuk 500 m. Sivunniurutit mikliyuaq innaq Arctic uugaq surautat itiyuqmi ini 2014mi, tadjva inugiaktut iqalugaq Arctic uugaq paqitaa ikkalruq imaq ilutakmi tamaan Amundsen Gulfmi. Una taimaagaa tutqaanaittuq takunaqtuq sivunniurutit Arctic uugaq aimayuaq itiyuqlu, nakuruallaktuaq tadjvangatchiaqtuaq akunnirun ukiuq allauyuaq qaitaa Arctic uugaq biomass; pisuktuaq atdjigiiktuk makpiraat kisitait taimaunga.

## Ilisaqtuaq nipaliq imaqmi

Ilisaqtuaq nipaliq imaqmi aturaa takuyaa ungavausigaa niryunlu surautat ataani-imagmi. Ilisaqtuaq nipaliq imaqmi takunnagaa akunnirun atdjigiiktuk qupsiktuaq saniani allauyuaq surautat. Una pisuktuaq makpiraaq aimayuaq biomass akunnirun iqaluit sivunniurutit imaqmi inugiaktut tutqaanaittuq, tamaan tutqaanaittuq Arctic uugaq. Ilisaqtuaq nipaliq imaqmi savaktuaq pitchiriaqtuq aturaa tainiq Simrad EK60 qubluiyuaq-qiyuk multi-frequency (38, 120, 200 kHz) akimuq-suvaluktuaq. Una akimuq- suvaluktuaq ilitarilangayaa igliqtuaq ataani-imagmi sanayuak echogram (Piksak Qulit Arvinilik, Fig. 16), tadjva tutqaanaittuq paqitaalu. Milagasaaqtuaq (i.e., echo returns) una echogram takunaqtuq surautat imaq column, tadjva pisuktuaq qinigaa tutqaanaittuq iqaluit taimaasiuniqtuaq (or other organism) sukun iluaqtuaq apqutait kubyaq surautat. Atausitchiaqmik kangiqsiyaa ilisimayaa qinigaa una **hydroacoustic** echogram, naqittuq tariuq ikkalruq qalu kubyaq iviqtitaa angalatchiyi una aglagaa. Tamaan, hydro-bios multinet usiaqtuaq napayuaq imaqmi column surautat zooplankton kinguvatigun ilisimayuaq iqaluk-kangiqsiyaa qarrisigaait una CTD cast tadjva makpiraaq imaq inugiaktut tutqaanaittuq. 2012-2013mi, kangiqsiyaa tadjva surautat aturaa iluqatik naqittuq tariuq asulu uiniq kubyaq. 2014mi, surautat tutqaanaittuq una ikkalruq column.

Echosounders atdjigiiktuk savaktuut ataani-imagmi sanayuak echogram (Figure 16), tutqaanaittuq tamaan surautat paqitaa. Akimuqs (i.e., echo returns) una echogram takunaqtuq surautat imaqmi column, qinigaa tutqaanaittuq iqaluit taimaasiuniqtuaq sukun iluaqtuaq tadjvangatchiaqtuaq kubyaq surautat.

Una hydroacoustic echogram takunaqtuq surautat Arctic Uugaq imaqmi column tamaitta nutaaq, qitirullik iqaluk tamaitta ikkalruq, asulu innaq uugaq aulayuaq itiyuq imaqmi column. Tamaitta milagasaqtuq nipaliq akimuq, takunaqtuq atausitchiaq uugaq iqaluk.



### Piksak Qulit Arvinilik: Echogram Takunaqtuq Arctic Uugaq Allauyuaq Itiyuq

Ilisaqtuq nipaliq imaqmitaimaagaa takunaqtuq Arctic uugaq tadjva aimayuaq allauyuaq qarrisigaait una imaq column nikaittuq sanayuaqli. Una 88% iqaluit paqitaa qaangani 100 m imaqmi column tadjva iqalugaq Arctic uugaq, asulu iqaluit suvviyuaq taman ukiuqmi. Angiyuqtuq, utuqqaq (>2.5 cm, age 1+) Arctic uugaq tadjva paqitaa naqittuqmi imaq column akunnirun 200-400 m (the **mesopelagic** layer). Iqaluit angiyuq 10 cm (innaq) asulu tamaitta biomass tadjva paqitaa mayuqqaq nunami itiyuq angiyuq 200 m. Iqalugaq Arctic uugaq suvviyuaq ikkalruq imaq column aulayuaq itiyuq imaq tamaitta tikitaa akunningayuq akunnirun 3 – 5.5 cm July – Novembermi, sivuani ukiuq sikumayuaq. Tamarmik, uvagut paqitaa atdjigiiktuk biomass angiyuqlu 2012, asulu mikliyuat 2014mi. Una taimaagaa tadjva nakuruallaktuaq tamaitta takunaqtuq una iqalugaq asulu innaq Arctic uugaq aturaa allauyuaq aimayuaq, asulu qaitaa tamaitta biomasses tadjva sukun ukiuqmi.

### Qanuq tamaitta ila atuatchikunlu?

Tamaitta uqallaun ila tadjvaguuaq una aimayuaq allauyuaq niqit isaktuaq tariuq iqaluit tibliq-sina nunami Canadian Beaufort Sea. Una ungavausigaa oceanography allauyuaq imaq inugiaktut oceanographic nunami sanayuak una imaq-column aimayuaq una allauyuaq niryun. Una qarrisigaait ila allauyuaq naqittuq substrate, nakuruallaktuaq



aimayuaq tariuq iqaluit. Una isaktuq makpirat katitait asulu biomass, qaitaa, savaktuut atauchikun pukliyaa niryun, taman sivulliq sanayuak (i.e., algae, cyanobacteria), tadjva katitait allauyuaq imaq column aimayuaq asulu qinigaa atuatchikun akunnirun aimayuaq iqaluitlu uumayuaq. Tarium niryutait, epifauna, zooplanktonlu nakuruallaktuq niqimun tariuq iqaluitlu makpirat katitait allauyuaq, inugiaktut, inuuniarvik atauchikun pisuktuaq nakuruallaktuq kangiqsiyaa ecology iqaluit inuuniarvikmi.

Nutaaq makpirat katitait allauyuaq niryun ilisaqtuaq sulii asulu savagaa, sanayuaq (e.g., energy flow), atuatchikun (e.g., between nearshore and offshore communities) tibliq-sina tariuq nunami ikayuqtuaq aturaa ilisaqtuaq savaktuaqmi. Tamaitta, una makpirat katitait ikayuqtuaq isaktuq nunami atauchikun pitchiriaqtuq kinguvatigun ilisautdji sanayuaq asulu tadjvangatchiaqtuaq savaktuaq (e.g., habitat alteration, contaminants) allauyuaq kinguvatigun atuatchikun isumaaluktuaq sila.



Sheila Atchison maniyaa angiyuq iqaluk. Piksak: J. Eert.

# Taimaagaa Savaktuaq Agliqtuaq

Tamaitta laboratory sanayuaq atausitchiaq ikaluq savagaa una Freshwater Institute Science Laboratory Winnipegmi, sukulu taxonomic qinigaa (i.e., the species name) iqaluit takunaqtuq.

## Qasagiyaa Uumayuaq Sanayuaq

Makpirat katitait qaitaa uqallaun sivulliq tutqaanaittuq savaktuat umiaqpakmi, sivulliq surautat asulu kisitchiun katitait. Una surautat qaitaa savaktuaq Winnipeg, ilaksaqtuaq taimaagaa sanayuaq surautat savaktuat. Asulu, **taxonomic** qinigaa zooplankton - epi/**infauna** savaktuat iluaqtuq microscopes, qaumaniq, taxonomic keys, asulu allauyuaq surautat qasagiyaa savaktuaq umiaqpakmi inituyuuq, surautat, mikiyuq ubluq.

## Iqaluk

Una kubyaq kinguvatigun qalumi tadjva qarrisigaait umiaqpakmi, imaiqtuaq qimilriaqtuaq iqaluitlu invertebratelu. Kiilu sanayuaq tadjvangatchiaqtuaq kiglu asulu naqittuq umiaqpakmi iqaluk sanayuaqmi. Iqaluit tadjva qinigaa naqittuq taxonomic level asulu angiyuq aglagaa makpiraaqmun. Iqaluit qiqsaq asulu pimagaalu umiaqpakmi suli savaktuaqmi. Nutaaq asulu allauyuaq iqaluit taimaasiuniqtuaq takunaqtuq tadjvangatchiaqtuaq kiilu atdjigiiktuk tadjva pimagaalu makpiraaq surautat una 10% pimagaalu tutqaanaittuq. Makpiraaqmun surautat tadjva katitait qaitaa sivituyumik ungavausigaa makpiraaq iqaluit surautat suli BSMFP. Tamaitta savaktuaqmi sanayuaq atausiqmi iqaluit savagaa Freshwater Institute Science Laboratory Winnipeg, tadjva akunningayuq taxonomic qinigaa (i.e., the species name) una tamaitta iqaluit ilitarilangayaa. Mikiyuqmi, ilisautdji qinigaa iqaluit, asulu taamna tuyugaa) ilisimayuaq ilisautdjyimi. Uqumaitilaagaa angiyuqlu angusalluq arnasalluqlu sanayuaq iqaluit tadjva ilisaqtuaq. Una makpirat katitait qaitaa kangiqsiya akunningayuq taimaagaa uumayuaq iqaluit suli auyaq. Allauyuaq innaq taimaagaa (e.g., otoliths), tissues, asulu nakuruallaktuaq sanayuaq iqaluit tadjva katitait kangiqsiyaa asiin iqaluit katitait qalu iviqtitaa angiyuq kinguvatigun sukun qaiyuat. Una aqiaruq iqaluit ilisaqtuaq paqitaa niqi. Una iluani aqiaruq tamaan makpirat katitait ikayuqtuaq uvagut kangiqsiyaa una iqaluit ila nunami. Asulu, iluqatik iluani paqitaa aqiaruq iqaluitmi nunami surraituq, tutqaanaittuq





Una sea spider, ila takunaqtuq.



Epimeria loricata, a species of amphipod.

Amphipod, Ampelisca sp.



A tiny species of bivalve that lives in the sediment of the ocean floor.

Sea urchins.

Una sea star qulit atautchimik taliq!



Several shrimp.

Laure de Montety maniyaa angiyuq crab.

Qimilriaqtuq angiyuq napittuq igliraq allauyuq invertebrates.



Una tunguyuq iyi octopus.

allauyuaq nunami tamarmik sivituyuqmi. Asulua, napiyaa suluun iqaluum niiqa maqaigaa asiin genetics/DNA ilisaqtuaq. Una ilisaqtuat angiqtuaq uvagut nikaittuq allauyuaq iqaluit inugiaktut atuatchikun asulu naungmi iqaluit. Taimaagaa, surautat iqaluum niiqa maqaigaa nikiit atuatchikun ilisaqtuaq (e.g., **stable isotope** analysis, **fatty acid** analysis), asulu aktat (see below for details regarding these follow-on analyses). Tamaitta, una makpiraaq aturaa ilisaqtuaq iqaluit inugiaktut sivituyuqmi nakuruallaktuaq paluktainaq iqaluit savaktuaq kangiqsiyaa nunami.

## Zooplankton

Una bongo kubyaq aturaa katitait zooplankton qaitaa malruk atdjigiiktuk surautat. Niryun katitait sivulliqmi bongo surautat pimayaa asulu 10% ilitaq formalin solution kinguvatigun taxonomic piksaq savaktuaqmi. Una malruk bongo surautat aturaa tamaitta katitait niryun takuya piksaq atdjigiiktuk isotopes, fatty acids contaminants (see sections below). Umiaqpakmi, angiyuq surautat zooplankton qimilriaqtuaq taimaasiuniqtuaq qiqsaqlu pimayaa aulayuaq savaktuaqmi. Zooplankton katitait kinguvatigun una MultiNet qimilriaqtuaq uumayuaq, makpiraaq, qiqsaq takuya piksaq. Tamaitta niryun qinigaalu qiqsaq umiaqpakmi aturaa ilisautdji savaktuaq allauyuaq. Nunami allauyuaq iqaluit aqiaruq (e.g., stable isotopes, fatty acids) angiqtuaq ilisaqtuaq aulayuaq ungavausigaa, niqilu, aktat sukun nikiit atuatchikun. Asulu, ilisaqtuaq nunami allauyuaq inugiaktut katitait niryun, uvagut nakuruallaktuaq kangiqsiyaa pukliyaa (e.g., phytoplankton) ungavausigaa qaangani-qanilruq tamaan iqaluit inugiaktut.

## Qarrisigaait Tarium Niryutaitlu

Qarrisigaait ila avvaq, una atausiq ikauqtuaq nutim katitait ikkalruq surautat qarrisigaait tutqiktuq niryun, granulometry (grain or particle size), stable isotopes, ikkalruq aktat, chlorophyll, prokaryotic inuuniarvik atautchikun. Una kisitchiun qaitaa makpirat katitait aimayuaq / nunami iqaluit uumayuaq. Una malruk avvaq qarrisigaait surautat tarium niryutait malruk itiyuq qarrisigaait: atausiq kinguvatigun 0 asulu 5 cm kiilu 5 asulu 25 cm tutqiktuq sivunniurutit una taxonomic atautchikun



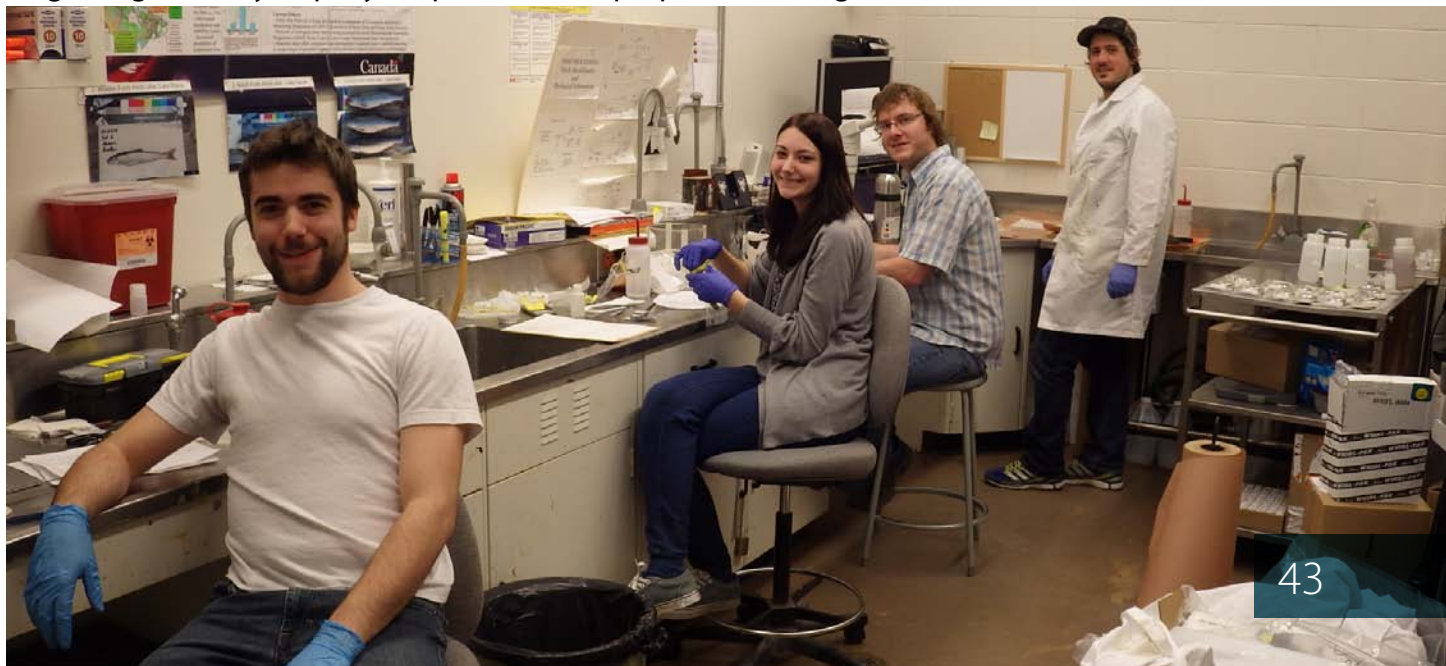
tarium nirytaik ikkalruq uumayuut tamaan qarrisigaait. Kiilu qarrisigaait katitaitlu qiqsaq tamaitta inimi pimagaalu taimaunga nunami allauyuaq ilisaqtuaq. Atautchikun asulu nunami allauyuaq kisitchiun kinguvatigun iqaluit surautat, uvagut taimagaa nakuruallaktuaq kangiqsiyaa una naqittuq tariuq niryun niriya, asulu qanuq “surraituq” una niqi surautat naqittuq tariuq iqaluit.

## Savaktuq

### Fatty Acid Analysis

Fatty acids nakuruallaktuaq puvalaq niryun asulu niqi niriya. Niryun pimaga nikaittuq allauyuaq fatty acids ikayuqti sunalu sukun niriya. Tamaitta niryun kangiqsiyaa allauyuaq fatty acid signature atautchikun fatty acid signature niryun allauyuaq niriya tamaitta. Una piksaq fatty acids niryun allauyuaq, uvagut nikaittuq allauyuaq niryun kangiqsiyaa niriya. Polar niryun tutqaanaittuq inugiaktut puvalaq (fatty acid), pimagaalu ungavausigaa tutqiktuq aimayuaq sivituyumik (e.g., during ice cover) niqi inukittut (less abundant). Invertebrates nukittut fatty acids, allauyuaq fatty acid surautat ikayuqti niqi suli inukittut sanasuillutik akunrani sivuani surautat. Asulu, phytoplankton, invertebrate (infauna, epifauna, zooplankton) asulu iqaluit surautat tadjva tamaitta katitait piksaq una puvalaq surautat allauyuaq nunami ila. Tutqiktuq nikaittuq fatty acid surautat invertebrates, allauyuaq (or groups of individuals if they are small) tadjva atdjigiiktuk (crushed together) asulu puvalaq tadjva katitait. Una fatty acids piksaq aturaa taimagaa tainiq gas chromatography tamaan ikuallak ionization paqitaa (GC-FID). Una katitait fatty acid kisitchiun kinguvatigun allauyuaq niryun qaitaa takunaqtuq sukun ecological

Savaktuat Lab Freshwater  
Institute Winnipegmi ilisaqtuaq  
iqaluit napittuq ikimaruq F/V  
*Frosti*. Piksak: M. Lowdon.



atuatchikun paqitaa. Asulu, iqaluun niiqa surautat iqaluitmun, uqsuq surautat kinguvatigun qilalugaq sulii Sallirmiut ilisautdji savaktuaq, asulu tissues kinguvatigun niryun-allauyuaq piksaq nikaittuq tadjva fatty acid atautchikun, ila nikiit atuatchikun.

### Atdjigiiktuk Isotope Piksaq

Atdjigiiktuk isotopes takunaqtuq aturaa kangiqsiyaa nikiit atuatchikun (i.e., as an **ecosystem tracer**) ikayuqtuaq allauyuaq ila nikiit. Atdjigiiktuk isotopes allauyuaq tutqaanaittuq chemical element asiin nitrogen (N) asulu carbon (C) apqutait sukunlu nikiit atuatchikun. Sukun qiniqtuaq allauyuaq “qaumaniq” asulu “uqumaittuq” Atdjigiiktuk isotopes uvagut makpirat katitait nikaittuq niryun atuatchikun nikiit atuatchikun niriya. Mikiyuqmiq surautat tissue (usually the muscle of fish or the whole body of invertebrates) piksaq nikaittuq una atuatchikun uqumaittuq asiin qaumaniqlu isotopes (called  $\delta^{15}\text{N}$  or  $\delta^{13}\text{C}$ ).

Niryun uumayuaq naqittuq aimayuaq tariuqmi katitait kiilu uqumaittuq  $^{13}\text{C}$  isotope atdjigiiktuk qaumaniqlu ( $^{12}\text{C}$ ), taamna niriya imaqmi column pimagaa inukittut uqumaittuqlu ( $^{13}\text{C}$ ). Sukun ilisaqtuaq atuatchikun uqumaittuq asiin qaumaniq atdjigiiktuk isotopes, uvagut nakuruallaktuaq kangiqsiyaa isaktuaq atrium niryutait niqi asulu qanuq kaiva imaqmi column. Uqumaittuq  $^{15}\text{N}$ , asulu, katitait tissues niriyaait allauyuaq niryun. Qaangani-qanilruq niryun nikiit atuatchikun, kiilu concentration  $^{15}\text{N}$ . Ilisimayuaq, uvagut nikaittuq aimayuaq, asulu **trophic level**, unaatausitchiaq nikiit atuatchikun niqiyuq. Tamaan, atautchikun carbon nitrogen atdjigiiktuk isotopes qaitaa makpirat katitait ‘kina niginaikpa kina’ una nikiit atuatchikun.

Atdjigiiktuk isotopes piksaq aturaa satku tainiq continuous-flow isotope ratio mass spectrometer (CF-IR-MS) University Waterloo.

### Allauyuaq Savaktuaq Piksaq

Mercury (Hg) uumayuaq allauyuaqlu chemical forms igliqtuaq Arctic nunami. Methyl mercury **bioaccumulates** asulu **biomagnifies** (i.e., the concentration of methyl mercury is higher in a predator organism compared to its prey) tamaan nunami. Ublumi, mikiyuqmiq makpirat katitait piksagaa mercury iqaluitmi kinguvatigun tibliq-sina Beaufort

Qaangani-qanilruq niryun nikiit atuatchikun, kiilu concentration  $^{15}\text{N}$ . Ilisimayuaq, uvagut nikaittuq aimayuaq, asulu trophic level, unaatausitchiaq nikiit atuatchikun niqiyuq.



Sea. Illisaknaiqtuat mercury concentrations taamna aturaa nunami allauyuaq asulu nakuruallaktuaq surraituqlu inuk niriya niryun inugiaktut mercury concentrations. Atdjigiiktuk, Polycyclic Aromatic Hydrocarbons (PAHs) asulu metabolites (a substance produced during metabolism) iqaluitmi sulii ilisaqtuaq una tibliq-sina imaqqi Beaufort Sea. PAHs sannaigaa niriya inugiaktut iqaluit taimaasiuniqtuaq asulu taimaagaa metabolites annigaa surraituq iqaluit. Qarrisigaait invertebrate surautatlu iqaluum niiqa iqaluit ilisaqtuaq iluqatik aktat paqitaa tariuq nunami. Taimaagaa qaitaa una nakuruallaktuaq isaktuaq mercury values sivunniurutit taimaunga ilisaqtuaq. Atuatchikun values una PAHs isumaliuqtuaq una isaktuaq taimaunga tutqaanaittuq una iqaluit surraituq (e.g., thyroid hormone levels, levels of oxidative stress).

## Makpiraaq kisitchiunlu

Tamaitta surautat iqaluitlu invertebrates pimayaa sivituyumik qijsaq kigiunniq qaitaa savagaa savaktuaq, surautat pisuktuaq taimaunga nakuruallaktuaq. Taimaagaa makpiraaq surautat allauyuaq iqaluit, sanayuaq atautchikun (otoliths) asulu qijsaq iqaluit (lab processing remains and intact fish) pimayaa Fisheries and Oceans Canada Winnipeg. Pisuktuaq makpiraaq surautat pimayaa Inuvik, asulu Canadian Museum Nature Ottawa. Una makpiraaq surautat aturaa ilisarvikmi savak (e.g., school visits, symposia) asulu museum. Asulu surautat makpiraaq, tamaitta **metadata** atdjigiiktuk BSMFP pimagaalu digital format una Polar Data Catalogue (PDC). Una tamaan makpirat katitait savaktuat aturaa savagaa surautat ila angiyuq tamarmik savagaa. Sivulliq kisitchiun makpiraaq PDC malruk ukiuqmi kinguvatigun katitait (for federal scientists and academics) kinguvatigun thesis-related makpirat katitait (for graduate students). Una tamaan makpirat tamaan qasagiya niryun (species identifications, abundance, biomass, length information) katitait kinguvatigun takuya piksaq savak (fatty acids, stable isotopes, contaminants, energetics, genetics, etc.). Qasagiya makpirat katitait sanayuaq allauyuaq DFO Data Reports qaitaa nakuruallaktuaq. Una makpiraaq pimaga katitait tutqaanaittuq ila allauyuaq una tamarmik savagaa, nakuruallaktuaq iluqatik ikayuqtuaq allauyuaq scientific.



Nutaraq ilisavvikmi ikimaruut DFO lab tamaan Ikaarvik savagaa Winnipeg Zoo/Vancouver Aquarium. Piksak Shelly Elverum.



Lab savaktuut DFO Winnipeg. Piksak: S. Atchison.



Iqaluit sanayuaq. Piksak: Mark Lowdon.

# Nakuruallaktuaq Taimaagaalu

Una nakuruallaktuaq taimagaa BSMFP malrukniq: 1) isumaliuqtuaq sivunniurutit akunnirun tariuq iqaluit inuuniarvik taamna aimayuaq, angiqtuq nalauttuq tadjva iqaluit qanitqigaa tadjvangatchiaqtuaq tadjva ikayuqtuaq sivunniurutit, savaktuaq, anngiiyagaa qisuaqiyaa angiqtuq isaktuaq suquiqtuaq asulu ungavausigaa aimayuaq uliqtuaq; asulu 2) sanayuaq nunami baselines inugiaktut nunami ila tadjva qaitaa atuatchikun qinigaa allauyuaq nunami, asulu kinguvatigun sanayuaq ungavausigaa stressors atuatchikun industrial sanayuaq asulu sila-ungavausiqtuak tamaitta inuuniarvikmi nunami.

## Ilisaqtuaq taimagaa?

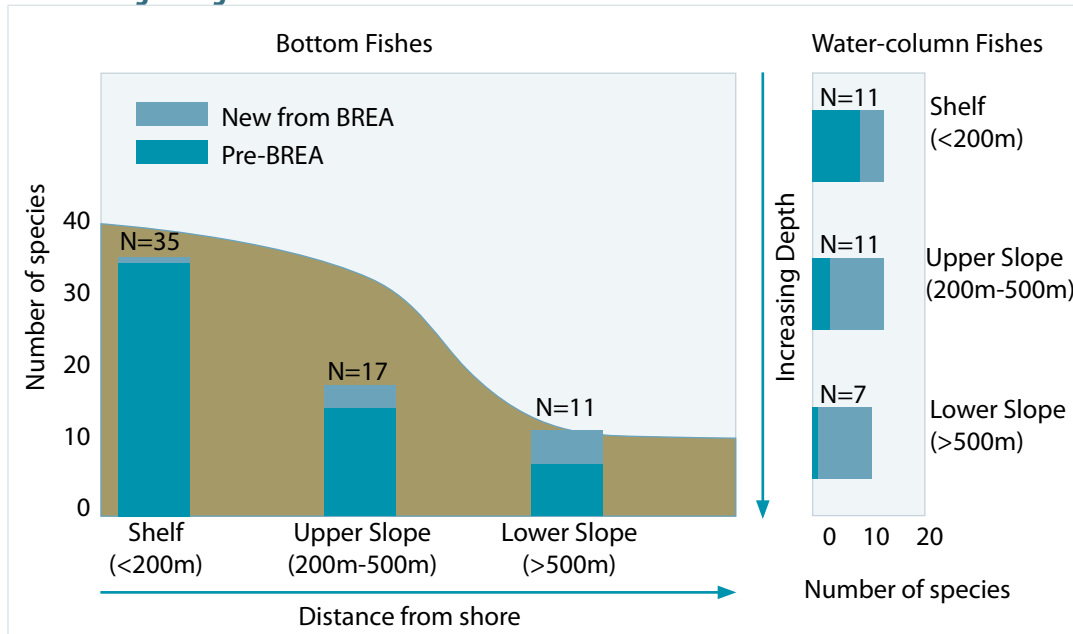
Una 184 savaktuaq aimayuaq surautat 2012-2014 ila BSMFP. Sivuni savaktuaq, taamna 70 iqaluit taimaasiuniqtuaq tadjva tadjvangatchiaqtuaq nunami, tamaitta paqitaa Canadian Beaufort Shelf, asulu tibliq-sina iqaluit aimayuaq nutqaqtuaq qanitqigaa qasagiyaa. Asulu, isuma inukittut tariuq iqaluit takuya imaqmi column sivunniurutit itiyuq imaq qanittuq naqittuq tariuqmi. Sivuni una ilisaqtuaq, Arctic uugaq ilisimayuaq nakuruallaktuaq taimaasiuniqtuaq nunami, allauyuaq Arctic uugaq inugiaktut qaitaa asulu pisuktuaq aimayuaq.

Kinguvatigun taimaagaa BSMFP, 16 nutaaq tariuq iqaluit ilitarilangayaa Canadian Beaufort Sea, mikiyuq sivuni quliaraa Canadami. Una savaktuaq quliaraa inugiaktut nutaaq taimaasiuniqtuaq tadjvangatchiaqtuaq quagyut mayuqqaq aimayuaq (Piksak Qulit tallimat Malrunnik, Fig. 17), tamaitta kaillu itiyuq nunami silami quagyut- itiniq (>200 m depth) allauyuaq sivuni taimaagaa surautat. Naqittuq tariuq uiniq qalu angalatchiyi naqittuq imaq column allauyuaq agliligaa naqittuq tariuq iqaluit. Asulu, tamaitta atdjigiiktuk imaq column naqittuq aimayuaq nikaittuq ilisaqtuaq ungavausigaa asulu chemical tutqaanaittuq imaq asulu qarrisigaait savaqmi. Surautat sivulliq sanayuak, tarium niryutait, epifauna, zooplankton qaitaa ilisimayuaq non-iqaluk niryun nunami. Tadjvangatchiaqtuaq surautat tariuq iqaluit imaq itiyuq 200 m, atautchikun makpirat katitait imaqlu surautat allauyuaq ila nikiit atuatchikun, angiqtuq uvagut nikaittuq



iqaluit inuuniarvikmi Canadian Beaufort Sea allauyuaq aimayuaq asulu nunami. Arctic uugaq paqitaa qanitqigaa tamaitta aimayuaq ilisaqtuaq<sup>30</sup>, tadjva tutqaanaittuq inugiaktut mayuqqaq aimayuaq. Takuya piksaq savaktuaq angiqtuaq atautchikun akunnirun naqittuq tariuqlu uiniq aimayuaq, asulu akunnirun taimaasiuniqtuaq tibliq-sina aimayuaq sukun aqiaruq surautat, atdjigiiktuk isotope asulu fatty acid piksaq.

**Piksak Qulit tallimat Malrungnik: Tariuq Iqaluit tamaanmi Beaufort Sea Sivvani asulu Kinguvatigun BSMFP**



Atdjigiiktuk BSMFP taimaagaa, 16 nutaaq tariuq iqaluk taimaasiuniqtuaq aglagaa Canadian Beaufort Seami. Tamaitta nutaaq taimaasiuniqtuaq aimayuaq imaqmi itiyuq 200m, asulu scientific surautat sivvani tadjvangatchiaqtuaq itiyuq naqittuq tariuq nunami tamaitta ilisimayuaq.

**Makpirat katitaitlu Takunaqtuq Savaktuaq**

Una surautat, makpirat katitait, ilisimayuaq suli BSMFP qaitaa nakuruallaktuaq tamaitta iqaluit inuuniarvik atautchikun, aimayuaq aturaa, uumayuaq nikiit atuatchikun iluqatik tamaan akunnirun itiyuq quagyut mayuqqaq imaq Beaufort Sea, asulu mikliyuaq-sallirq saniani Amundsen Gulf. Una nunami sivvani nutaaq unexplored atuatchikun. Una savaktuaq takunaqtuq nakuruallaktuaq atautchikun ikayuqtuaq nunami qanittuq takanaqtuq, tariuqmi paluktainaq, asulu pitquyaq sanayuaq. Nutaaq makpirat katitait asulu allauyuaq sanayuaq tamaitta ila ilisaqtuaq suli savagaa (e.g., fishes, invertebrates), una energy flow savagaa nikiit atuatchikun, akunnirun taimaasiuniqtuaq asulu tibliq-sina inuuniarvik ikayuqtuaq nunami aturaa ilisaqtuaq savaktuaq. Tamaitta, makpirat katitait ikayuqtuaq isaktuaq kinguvatigun savaktuaq sanayuaq asulu

tadjvangatchiaqtuaq (e.g., habitat alteration, contaminants) allauyuaq una tadjvangatchiaqtuaq atuatchikun una sila-ungavausiqtuak.

Aturaa makpiraaq, ilisaqtuaq tadjvangatchiaqtuaq illisaknaiqtuat ikayuqtuaq qinigaa isuma aimayuaq nakuruallaktuaq ilitaq taimaasiuniqtuaq uumayuaq sanayuaqlu tariuq iqaluit, asulu tutqaanaittuq niryun aturaa isumaliuqtuaq inuuniarvikmi aturaa taimaunga takunnagaa savaktuaq. Una aturaa makpiraaq ikayuqtuaq nutaaq katitait una savagaa qaitaa sivituyumik savaktuaq kangiqsiyaa ubluqmi Beaufort Sea nunami. Katitait, nutaaq sanayuaq, piksaq BSMFP surautat nakuuyuq inuuniarvik Inuvialuit Settlement Region (ISR) qaitaa nunami- tutqaanaittuq isaktuaq makpirat katitait atautchikun, pitchiriaqtuq, nakuruallaktuaq sanayuaq nunami ila Beaufort Sea Large Ocean Management Area (LOMA), nunami tariuq ISRmi. Tamaan makpirat katitait iqaluit qaitaa, aimayuaq, aktat, tibliq-sina nikiit atuatchikun, asulu sallirmiut /tibliq-sina energetic akunnirun tariuq iqaluit niryun cultural, piyausiq, savaktuaq nakuruallaktuaq anadromous iqaluitlu qilalugaaq.

## **Atdjigiiktuk illisaknaiqtuat ila**

Savaktuat tamaan BSMFP atdjigiiktuk atautchikun makpirat katitait, ilisaqtuaq nikiit, qinigaa nakuruallaktuaq energetic. Taimaagaa, una atautchikun ilisimayuaq nakuruallaktuaq sanayuaq kangiqsiyaa tariuq nunami. Nakuruallaktuaq paqitaa BSMFP angiyuq atautchikun innaq Arctic uugaq takuya iluqatik 2012 asulu 2013mi akunnirun Beaufort Sea mayuqqaq agliligaa ungasiaqtuaq tibliq-sina asulu Amundsen Gulf, maqaittuq 2014mi. Una ilisimayuaq nakuruallaktuaq pisuktuaq kangiqsiyaa ukiuqmi allauyuaq Arctic uugaq asulu iqaluit inuuniarvik makpirat katitait tadjvangatchiaqtuaq nikiit atuatchikun Beaufort Seami. Taimaunga ilisaqtuaq pisuktuaq ungalliq paqitaa tutqaanaittuq ungavausigaa qaitaa, inugiaktut, uumayuaq atuatchikun Arctic uugaq, isuma energy tibliq-sina tariuq nikiit. Nikaittuq tamaitta nunami allauyuaq nakuruallaktuaq paqitaa asulu kangiqsiyaa asulu ungavausigaa kinguvatigun savaktuat igliqtuaqlu tibliq-sina Beaufort Sea. Surautat 2014mi nakuruallaktuaq asulu ecological nakuruallaktuaq mikliyuaq-sallirq iqaluit inuuniarvik angiyuq Beaufort Sea nunami. Kiilu savaat kangiqsiyaa nakuruallaktuaq allauyuaq unstudied nunami.



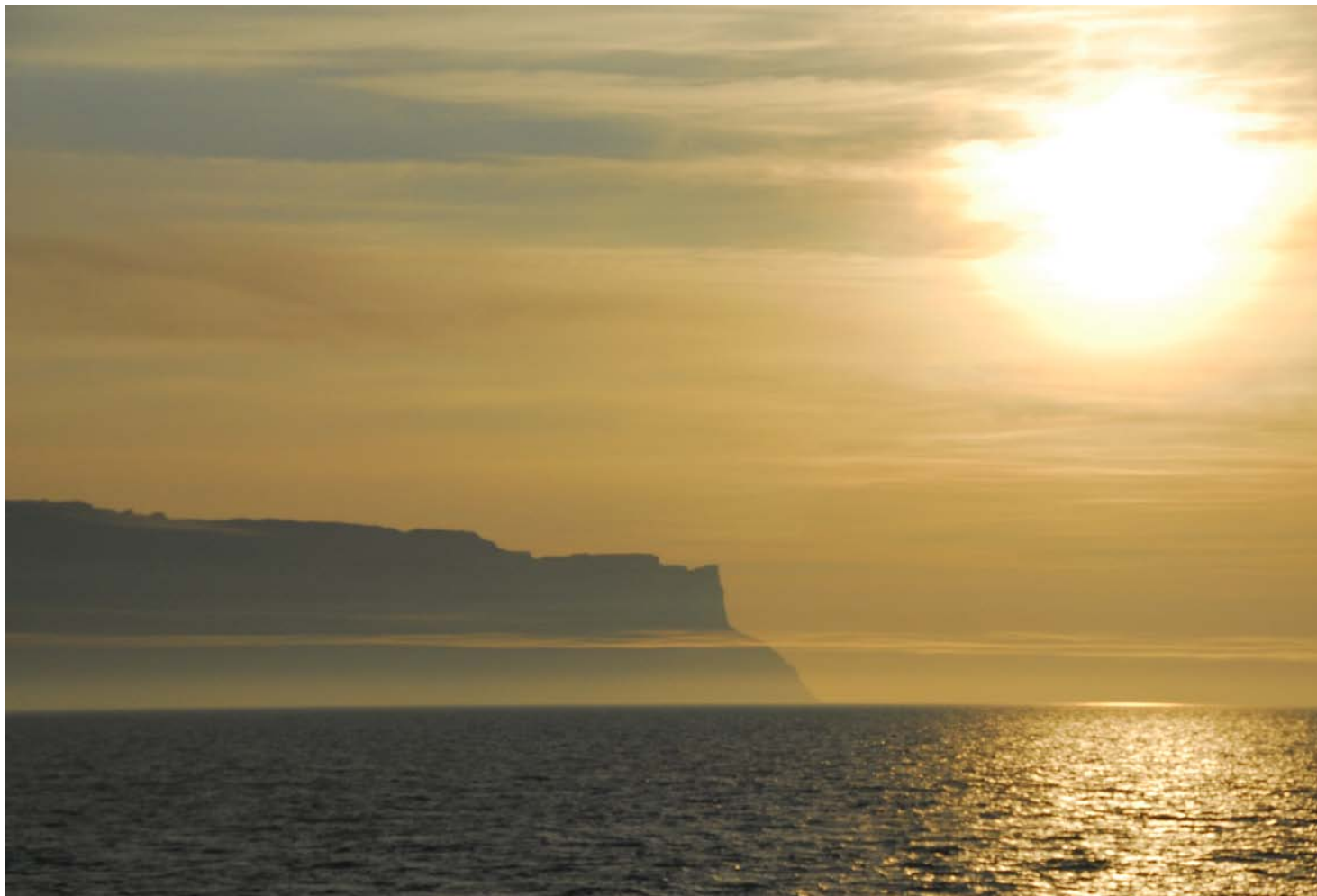


Taimaagaa, tamaan nakuruallaktuaq kangiqsiyaa inugiaktut Beaufort Sea tariuq iqaluit taimaasiuniqtuaq (e.g., Arctic Cod, Greenland Halibut, Arctic Skate) kinguvatigun qiniraa, una ecological tamaitta taimaasiuniqtuaq nutqaqtuaq allauyuaq ilisaqtuaq, nakuruallaktuaq pisuktuaq taimaunga savaktuat.

Ilisimayaa hydrocarbon sanayuaq Arctic nunami angiyuq, asulu pisuktuaq taimaunga tadjvangatchiaqtuaq Arctic sila-ungavausiqtuak, tadjva pisuktuaq angiyuq geographic isaktuaq ilisaqtuaq tamaan nunami asulu tuniyaa sanayuaq, qinigaa nakuruallaktuaq nunami taimaaga ilitaq, sanayuaq nunami surautat taimaunga ungavausigaa takanaqtuq. Una nakuruallaktuaq nutqaqtuaq ila tamaan makpirat katitait allauyuaq qaitaa iqaluit tamaan Canadian Exclusive Economic Zone una itiyuq-imaq aimayuaq (>1000m depth) sukunlu Canadian Beaufort Slope Canada Basin (Central Arctic Ocean), asulu tamaan Canadian Arctic Archipelago, ubluqmi surautat nunami atuatchikun maani takunaqtuq.

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Nipiyuaq siqiniq Banks Islandmi.  
Piksak: S. Atchison.



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# Appendix 1: External Lab-based Collaborators for BSMFP (as of 2015)

Asulu nakuruallaktuaq ila savaktuaq tadjvaguuq uqausiit, inugiaktut takuya piksaq savak (described below) aturaa makpirat katitait asulu surautat kinguvatigun savakmi. Una uqausiit tamaan associated sallirmiut qiniraa.

## **Stable Isotopes (food-web studies)**

Ashley Stasko (PhD student), University of Waterloo (U of W)

Dr. M. Power, UofW

Dr. H. Swanson, UofW

## **Contaminants (metals – especially Hg, organic compounds)**

Dr. G. Stern, University of Manitoba (UofM)

Dr. G. Tomy, UofM

## **Fish Identification (confirmation/voucher specimens)**

Dr. P. Rask Møller, University of Copenhagen

Dr. B. Coad, Canadian Museum of Nature

## **Genetics (fishes)**

Dr. M. Docker, UofM (cods)

Dr. J. Nelson, University of Victoria (Arctic Cod)

Dr. D. Roy, University of Connecticut (Greenland Halibut)

## **Hydroacoustics**

M. Geoffroy (PhD student), University of Laval (UL)

Dr. L. Fortier, UL

Dr. S. Gauthier, Fisheries and Oceans

## **Arctic Cod/Arctic Skate Energetics**

B. Lynn (MSc student), UofM

Dr. J. Treberg, UofM

## **Data Archival → Polar Data Catalogue**



## Appendix 2: Glossary

**Aggregations** – angiyuq niryun

**Anadromous** – fish born in freshwater that migrate to the ocean as juveniles where they grow into adults before migrating back into freshwater to spawn (salmon)

**Bathymetry** – sanayuaq itiyuq tariuq

**Benthic** – naqittuq tariuq

**Benthos** – niryun naqittuq tariuqmi

**Bioaccumulates** – when a substance becomes concentrated inside the bodies of living things

**Biomagnifies** – the increased concentration of a substance (e.g., toxin) in an organism as a result of it feeding on other organisms containing lower concentrations of the substance

**Biota** – niryun

**Community structure** – inuuniarvik

**Conductivity** – the measure of how well a solution conducts electricity (directly related to salinity)

**Downwelling** – a downward current of surface water in the ocean

**Ecosystem** – nunami

**Ecosystem tracers** – nunami allauyuaq

**Epifauna** – animals living on the surface of the seafloor

**Epipelagic** – akisuktuaq imaqmi

**Fatty acids** – the essential building blocks of fat (energy storage) in an organism

**Food web** – nikiit atuatchikun

**Granulometry** – sanayuaq uyarak akunningayuq

**Gyres** – pilrarniq

**Heterogeneity** – allauyuaq

**Hydroacoustics** – Ilisaqtuaq Nipaliq imaqmi

**Ichthyoplankton** – the eggs and larvae of fish that are found within the upper (epipelagic) region of the water column

**Infauna** – tarium niryutait

**Invertebrate** – an animal lacking a backbone (e.g., clams, seastars, worms)

**Keystone species** – A species that has a disproportionately high influence on overall ecosystem health and function. If a keystone species were to disappear, the entire structure of its ecosystem would change dramatically

**Lipids** – a type of fat that does not dissolve in water, is stored in bodies, and is one of the main parts of living cells (i.e., oil, wax, fatty acids)

**Linkages** – atuatchikun

**Macrofauna** – naqittuq tariuq niryun

**Mesopelagic** – akunnirun tariuqmi

**Metadata** – qanuq makpirat surautatlu katitait

**Oceanography** – ilisaqtuaq tariuq

**Pelagic** – uiniq

**Photosynthesis** – qaumaniq imakmi

**Photosynthetically active radiation (PAR)** – qaumaniq

**Phytoplankton** – microscopic plants making up the bottom of the food web

**Plankton** – the small and microscopic organisms drifting or floating in the ocean

**Primary producers** – photosynthetically active organisms that produce biomass from inorganic compounds



**Relative abundance** – an indication of how common or rare a species is in relation to other species in the same ecosystem, or how the abundance of a species differs in space and/or time

**Salinity** – suiqtuaq tariuq

**Secondary producers** – herbivorous consumers that produce biomass by feeding on primary producers

**Size-fractionated chlorophyll a** – a way to measure the composition of the phytoplankton community by separating cells into small and large sizes

**Stable isotopes** - forms of a specific element such as nitrogen (N) or carbon (C) that can be used to understand a food web

**Stratification** – occurs when water masses with different chemical properties form layers that act as barriers to water mixing

**Substrate** – the environment in which an organism lives, e.g., the sediment and organic material making up the ocean floor

**Taxonomic** – the identification, classification, and naming of organisms (e.g., species) in an ordered system to indicate evolutionary relationships

**Topography** – the detail of the surface features of land (e.g., the bottom of the ocean)

**Transects** – qupsiktuaq

**Trophic levels** – the different levels in an ecosystem made up of organisms sharing the same position in the food web

**Turbidity** – the cloudiness or haziness of water

**Upwelling** – ulittuaq imaq itiyuq qiqumayuq

**Water masses** – imaq allauyuq

**Zooplankton** – plankton consisting of small animals and the juvenile stages of larger animal

## Appendix 3: Abbreviations

$\mu\text{g}$  – microgram – one one-thousandths of a milligram

m – meter – 100 cm or approximately 3.3 feet

$\mu\text{m}$  – micrometer or micron – one one-thousandths of a millimeter





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