8MINUTES OF THE MEETING
STEERING COMMITTEE (SC)

Meeting Noº 63
Thursday, November 30, 2023
1:30 PM to 4:00 PM
Videoconference on TEAMS

Present:	Félix Boulanger	EMRWB representative Nation Government
	Marc Dunn	Niskamoon Corporation
	Luc Duquette	Hydro-Québec
	Carine Durocher	Hydro-Québec
	Jean-Philippe Gilbert	Hydro-Québec left
	Louie Kanatewat	Cree Nation of Chisasibi
	Mélanie Leblanc	Niskamoon Corporation
	Geraldine Mark	Cree Nation of Wemindji
	Johanna Ménélas	Hydro-Québec
	Ernie Rabbitskin	Niskamoon Corporation
	Robbie Tapiatic	Cree Nation of Chisasibi
Guest:	Mary O'Connor	University of British Columbia
	Urs Neumeier	University of Quebec in Rimouski
	Vincent Gautier-Doucet	Cree Nation Government
	Michel Gosselin	University of Quebec in Rimouski
Absence:	James Bobbish	Cree Nation of Chisasibi
	Daniel Brosseau	Hydro-Québec
	John Lameboy	Cree Nation of Chisasibi
	Josée Lefebvre	Canadian Wildlife Service
	Marie-Eve Lemieux	Hydro-Québec
	Gregory Mayappo	Cree Nation of Eastmain
	Graeme Morin	Cree Nation Government
	Ernest Moses	Cree Nation of Waskaganish
	Roderick Pachano	Cree Nation of Chisasibi

MEETING CHAIR AND SECRETARY

Luc Duquette chaired the meeting, and Johanna Ménélas acted as the meeting secretary.

PROPOSED AGENDA

1. Approval of the Agenda
2. Approval of the minutes from the previous meetings (Johanna Ménélas):
   - January 12, 2022 – Noº 45
   - August 31, 2022 – Noº 50
   - September 21, 2022 – Noº 51
   - October 27, 2022 – Noº 52
   - December 8, 2022 – Noº 53
3. Presentation of Final report of the ISMER – Ocean team (Urs Neumeier)
4. Presentation of eelgrass team – invertebrate (Mary O'Connor)
5. Miscellaneous
6. Summary and Next Steps
7. Next Meeting

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1. Approval of the Agenda

The Chair reviewed the agenda, and no additional points were proposed. Thus, the agenda was approved as presented.

Following this, the Chair sought clarification on point 4, prompting Melanie Leblanc (**Mrs. Leblanc**) to provide an explanation. Subsequently, the Secretary suggested adding the presentation of DilliTrust under miscellaneous, a proposal welcomed by the committee.

2. Approval of the minutes from the previous meetings

The Committee proceeded to discuss the approval and review of the minutes from the following previous meetings:

- January 12, 2022 – Noº 45
- August 31, 2022 – Noº 50
- September 21, 2022 – Noº 51
- October 27, 2022 – Noº 52
- December 8, 2022 – Noº 53

The Chair raised concerns about the absence of several members and inquired about the appropriate course of action. Mrs. Leblanc assured the Committee that Marc Dunn (**Mr. Dunn**) had already been reviewing the minutes and would provide his comments. Carine Durocher (**Mrs. Durocher**) suggested allowing a two-week period for comments, a proposal unanimously agreed upon by all present members.

Additionally, the Chair proposed involving Alain Tremblay (**Mr. Tremblay**) and Réal Courcelles (**Mr. Courcelles**) in the review process, given their attendance at the meetings. It was decided to redistribute the minutes to all members.

Furthermore, Mrs. Durocher suggested reverting to the numbering system for the minutes. The Secretary explained that since assuming the role, she is uncertain about the current numbering of the meetings, but assured the Committee that she would address this issue promptly and ensure clarity moving forward.

Decision: Members, including previous member such as Mr. Tremblay and Mr. Courcelles considering their attendance at these meetings, will have a two-week period to review and provide comments on the minutes.

3. **Presentation of Final report of the ISMER – Ocean team**

Urs Neumeier (**Mr. Neumeier**) delivered a presentation titled "Coastal oceanography of eastern James Bay – Final report," and a copy of the presentation is attached to these minutes for reference.

However, the Secretary acknowledged an oversight in not forwarding the document to the Committee beforehand and apologized for the omission.

During his presentation, Mr. Neumeier outlined the findings of the ISMER – Ocean team. He began by explaining the interdisciplinary nature of the project, touching on various aspects such as light, chlorophyll, nutrients, geology, sediment cores, and modeling. He highlighted the involvement of a multidisciplinary team and mentioned key contributors. The project involved extensive fieldwork and data analysis, with contributions from research assistants, students, and technicians. Key findings included higher concentrations of dissolved organic matter and suspended particulate matter in Eastern James Bay, leading to reduced light for photosynthesis. Changes in freshwater discharge and precipitation patterns were also observed, impacting the ecosystem.

Mr. Dunn raised questions regarding temperature trends and eelgrass data, suggesting the need for further analysis. Mrs. Leblanc and Mrs. Durocher provided insights into biomass sampling and precipitation trends. Mr. Neumeier discussed the modeling approach and data sources, acknowledging limitations in bathymetric data and the need for better validation. Mr. Dunn emphasized the importance of clear documentation of limitations and recommendations for future data collection.

Mr. Dunn inquired about the time-consuming nature of collecting bathymetry data in these areas. Mr. Neumeier responded, explaining that the process primarily involves using a single beam, with occasional adjustments needed every 200 to 500 meters. Additionally, he highlighted the challenges posed by the size and movement of boats, suggesting the potential use of larger vessels for data collection. Mr. Dunn further probed into the feasibility of utilizing larger boats for this purpose, to which Mr. Neumeier expressed uncertainty due to logistical factors and weather conditions.

Mrs. Durocher sought clarification on the significance of bathymetric data presented in relation to the eelgrass beds, particularly in areas distant from the coast. Mr. Neumeier elaborated on the importance of such data for modeling purposes, emphasizing its role in understanding wave behavior and coastal dynamics. He underscored the relevance of bathymetry for predicting wave patterns and their influence on sediment transport, thereby affecting eelgrass habitats.

Subsequently, Mrs. Leblanc and Mary O’Connor (**Mrs. O’Connor**) elaborated on additional benefits of bathymetric data, including its utility in mapping eelgrass beds and informing environmental assessments. Mrs. O'Connor emphasized the critical need for accurate bathymetry to model water currents effectively, highlighting its role in ecosystem management and climate forecasting.

Mr. Dunn intervened to provide clarity for the benefit of non-scientific members, explaining that bathymetry refers to the measurement of water depth in oceans, rivers, or lakes. He prompted Mr. Neumeier to elaborate on the spatial distribution of light availability in the study area, particularly concerning the influence of ice breakup on light penetration. Mr. Neumeier clarified the mechanism by which ice cover impacts light availability, attributing reductions in light penetration to the presence of ice cover and its subsequent melting, which releases sediment into the water column.

Mrs. Durocher raised a question regarding the unexpected low salinity in certain areas, leading Mr. Neumeier to explain the circulation patterns influencing salinity. Mrs. Durocher sought clarification on the term "murky water" and its relationship to suspended particles, prompting Mr. Neumeier to explain the interplay between light attenuation and sediment concentration in coastal waters. He showcased the integration of satellite data in assessing water quality parameters, offering insights into future modeling endeavors.

As the discussion concluded, the Chair interjected to ensure sufficient time for subsequent presentations, acknowledging the need for further review of the preliminary report. He also addressed queries of Mr. Neumeier regarding the frequency of steering committee meetings, highlighting their variable nature based on agenda items and document review requirements. Finally, Mr. Neumeier concluded the presentation by expressing gratitude.

4. **Presentation of eelgrass team – invertebrate**

Mrs. O’Connor delivered a presentation titled "CHCRP – Eelgrass Team Updates," and a copy of the presentation is attached to these minutes for reference. Throughout the presentation, Mrs. O'Connor elaborated on various aspects of the research conducted by the Eelgrass Team, particularly focusing on invertebrate biodiversity within eelgrass ecosystems.

During the presentation, Mrs. O'Connor welcomed questions from the Committee members. Mrs. Durocher expressed interest in understanding the relationship between turbidity and wider eelgrass shoots. Mrs. O'Connor explained that while there is a correlation between turbidity and shoot width, it is not a significant factor on its own but rather part of a broader environmental context. She indicated that further exploration of this relationship is planned for the second phase of the project.

The Chair inquired about the potential influence of different populations of animals within eelgrass meadows on fish populations. Mrs. O'Connor acknowledged the importance of this question, highlighting the role of certain species as preferred food sources for fish and the potential implications for fish abundance within different eelgrass habitats.

Mr. Dunn added insights from interviews with land users, emphasizing the perception of eelgrass as a nursery area for smaller fish. He also suggested conducting underwater fish surveys in phase two to gather more data on fish presence and behavior within eelgrass habitats.

Mrs. Leblanc expressed appreciation for Mrs. O'Connor's expertise in biodiversity and posed a question regarding the impact of different populations of animals on fish populations. Mrs. O'Connor elaborated on the potential cascading effects of changes in invertebrate populations on fish abundance, emphasizing the need for further observations to draw conclusive insights.

In conclusion, Mrs. O'Connor thanked the Committee for their engagement and patience, noting the considerable time and effort involved in conducting the taxonomy analysis. She expressed appreciation for the opportunity to utilize various data sources to enrich the project's findings.

5. **Miscellaneous**

Due to time constraints, this item was not able to be discussed.

6. **Summary and Next Steps**

Due to time constraints, this item was not able to be discussed.

7. **Next Meeting**

After considering the necessity to discuss phase 2 of the project and following the exchange on the availability of each, it was agreed that the next meeting will be held on Monday, January 22, 2024, from 1:30 to 5:00 pm. The meeting will be conducted via Teams. Mrs. Leblanc volunteered to distribute the relevant documents for the upcoming meeting, as the Secretary will be on vacation.

ADJOURNMENT OF THE MEETING

Considering that the allotted time has elapsed, the meeting is adjourned at 4:04 PM.

The meeting secretary,

Johanna Ménélas

Approved version

CHCRP

Eelgrass Team Updates

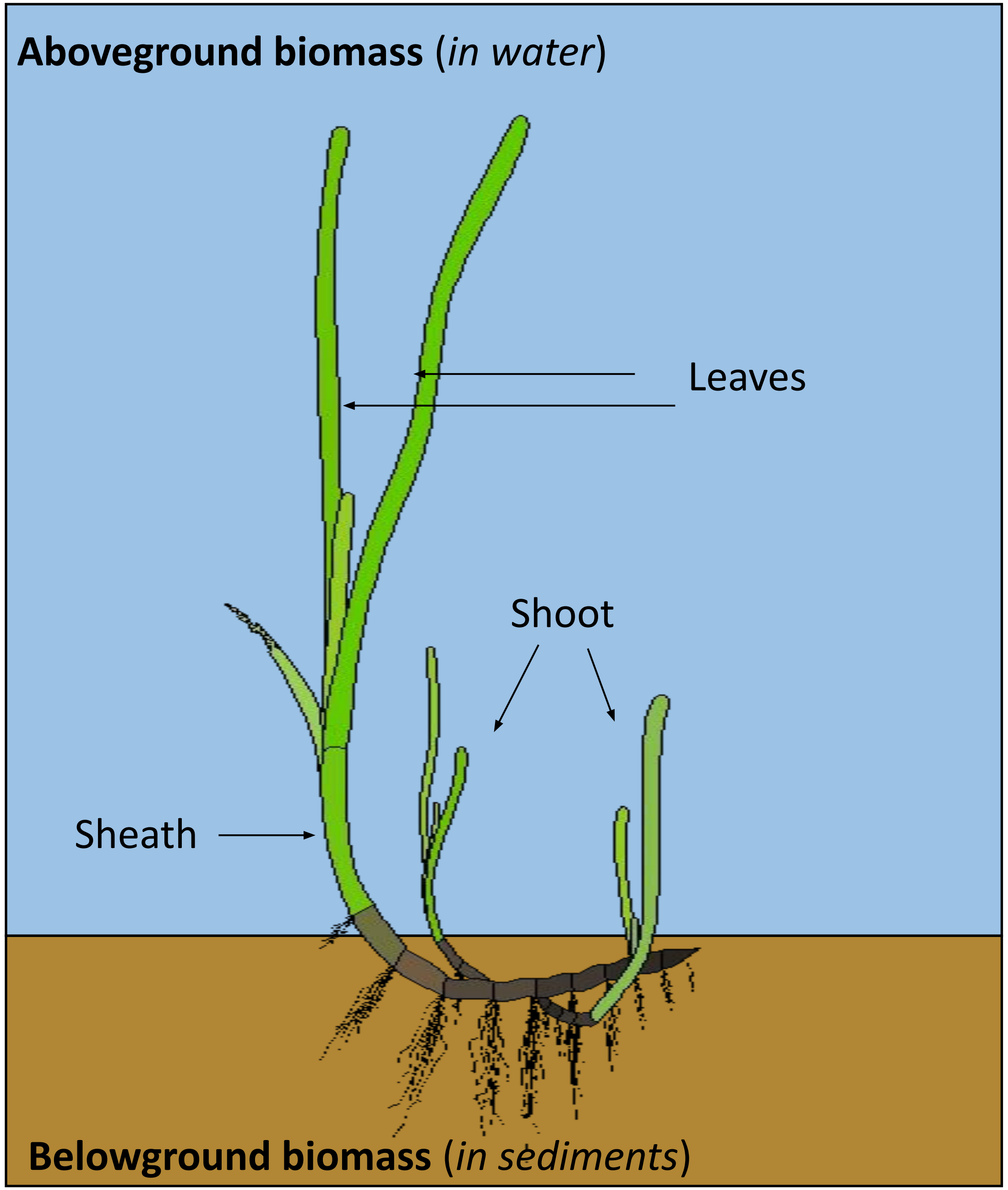
Mary O'Connor
Melanie Leblanc, Nicole Knight,
Kaleigh Davis

November 30 2023

Brigitte Leblon, Fanny Noisette, Lou Richer

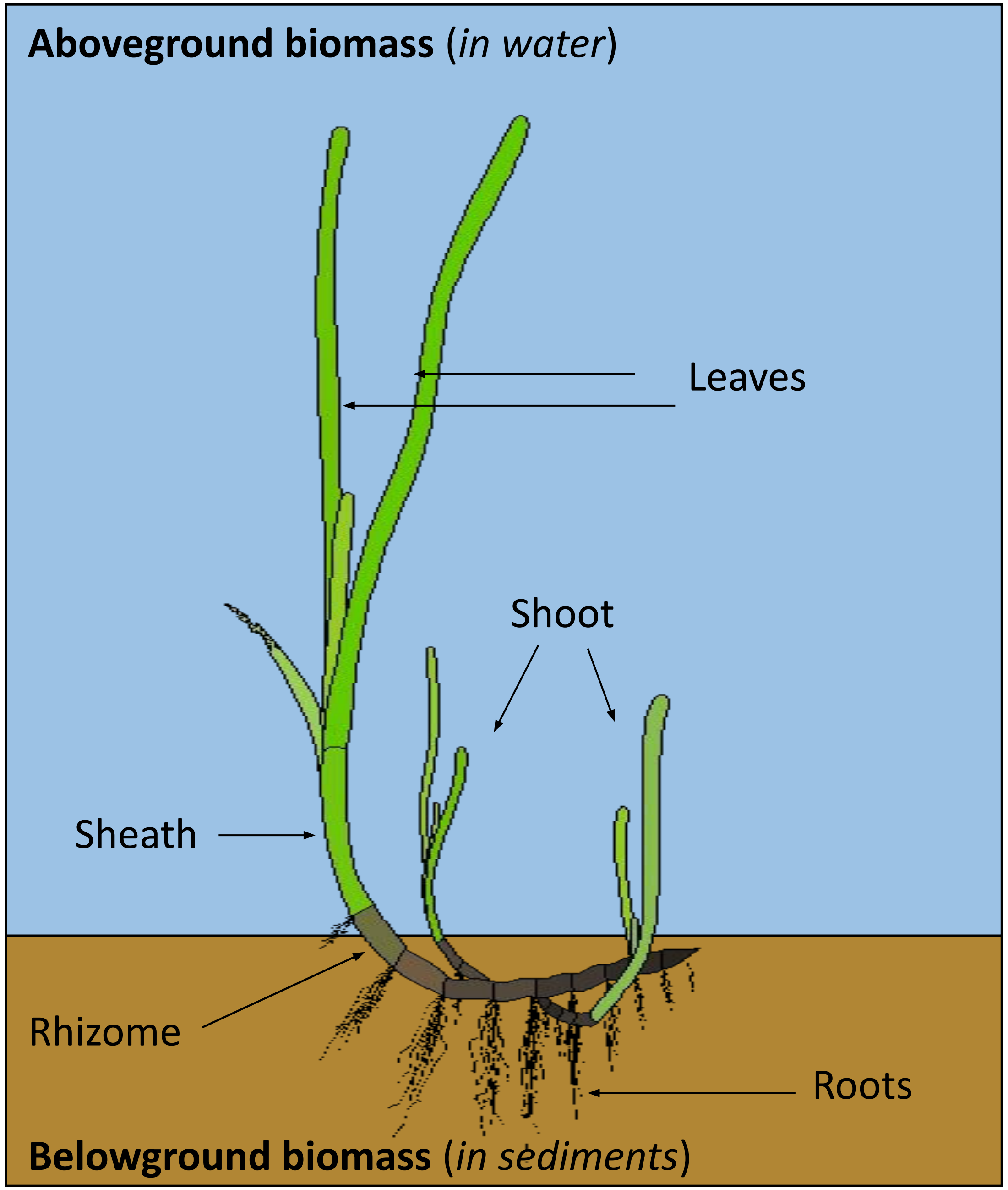
In 2019, the Eelgrass Team proposed to assess eelgrass health using different approaches including:

- Assess eelgrass aboveground abundance (biomass and density)
- Take different measurements on the eelgrass shoots (example shoot length)



In 2019, the Eelgrass Team proposed to assess eelgrass health using different approaches including:

- Assess eelgrass aboveground abundance (biomass and density)
- Take different measurements on the eelgrass shoots (shoot length)
- Determine if eelgrass condition and growth are limited by nutrients in the water
- Assess the response of eelgrass to different light conditions



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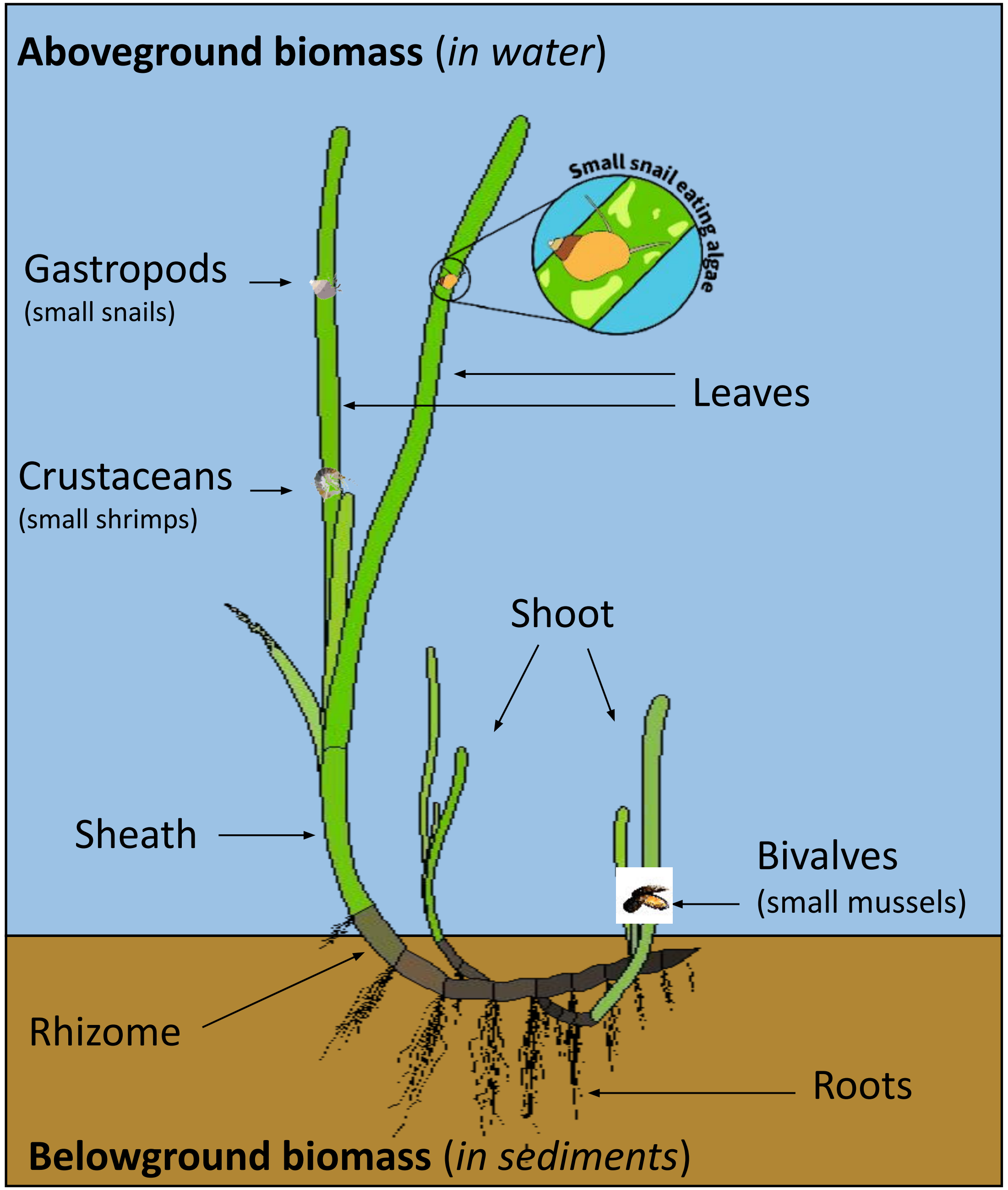
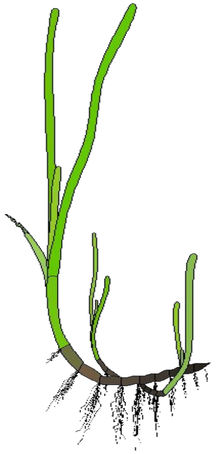
- Determine if eelgrass condition and growth are limited by nutrients in the water
- Assess the response of eelgrass to different light conditions
- Assess epifaunal biodiversity in eelgrass beds

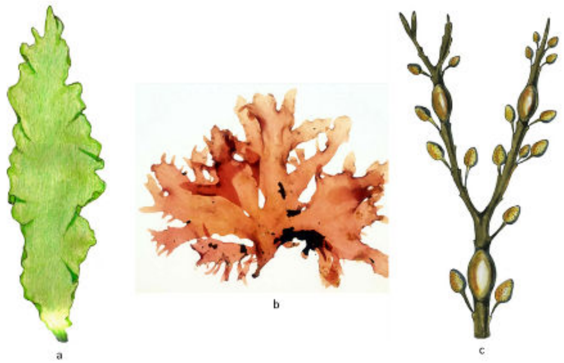


Eelgrass Food Web



eelgrass

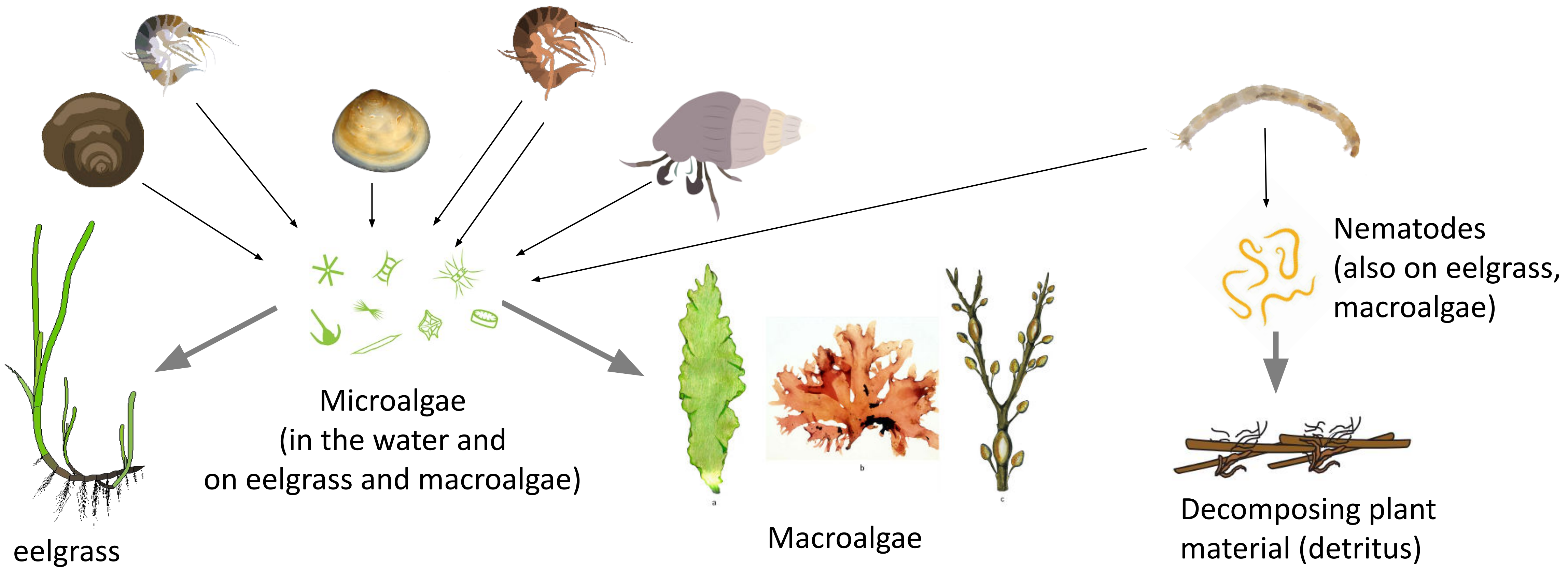
Microalgae
(in the water and
on eelgrass and macroalgae)



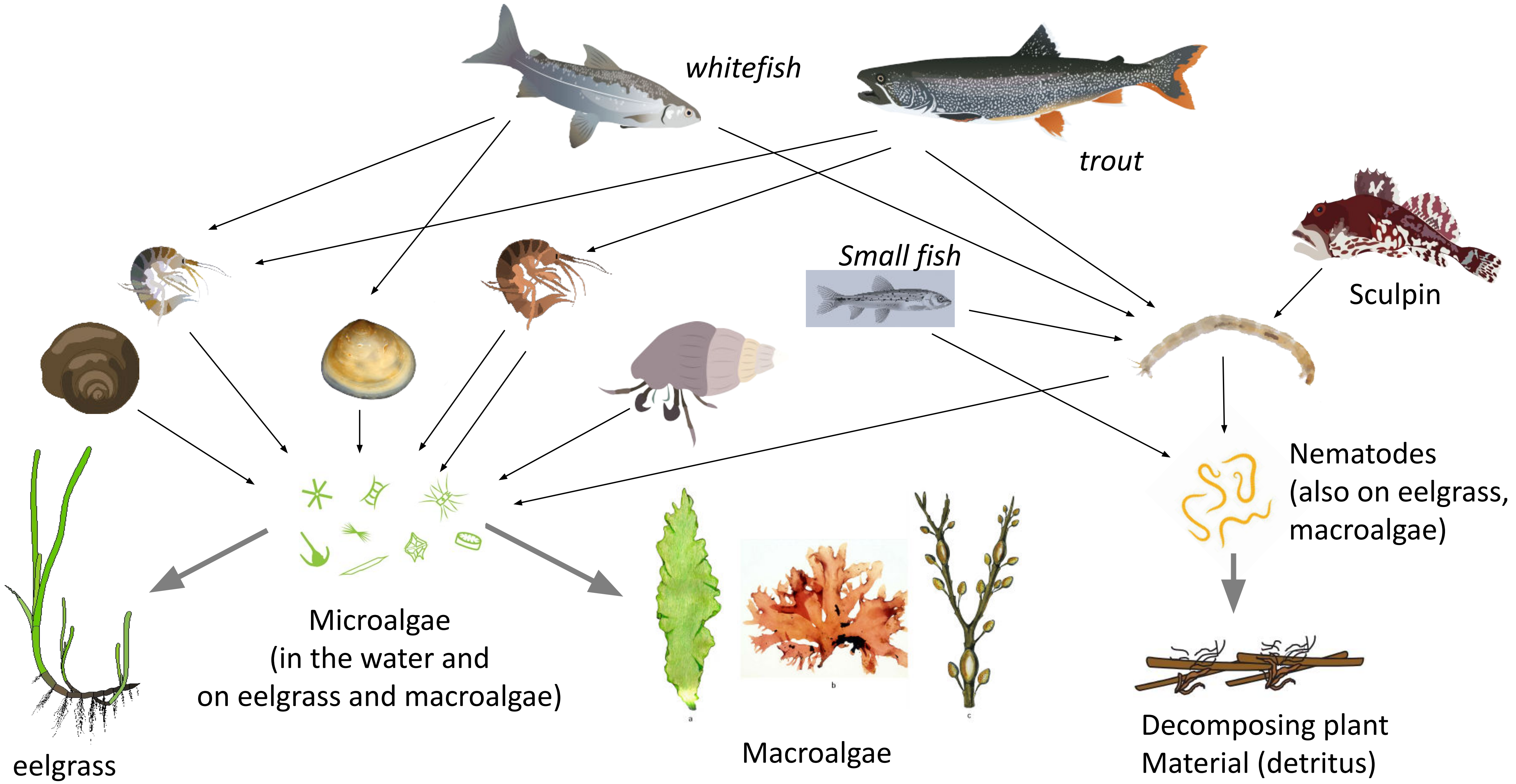
Macroalgae

Decomposing plant
material (detritus)

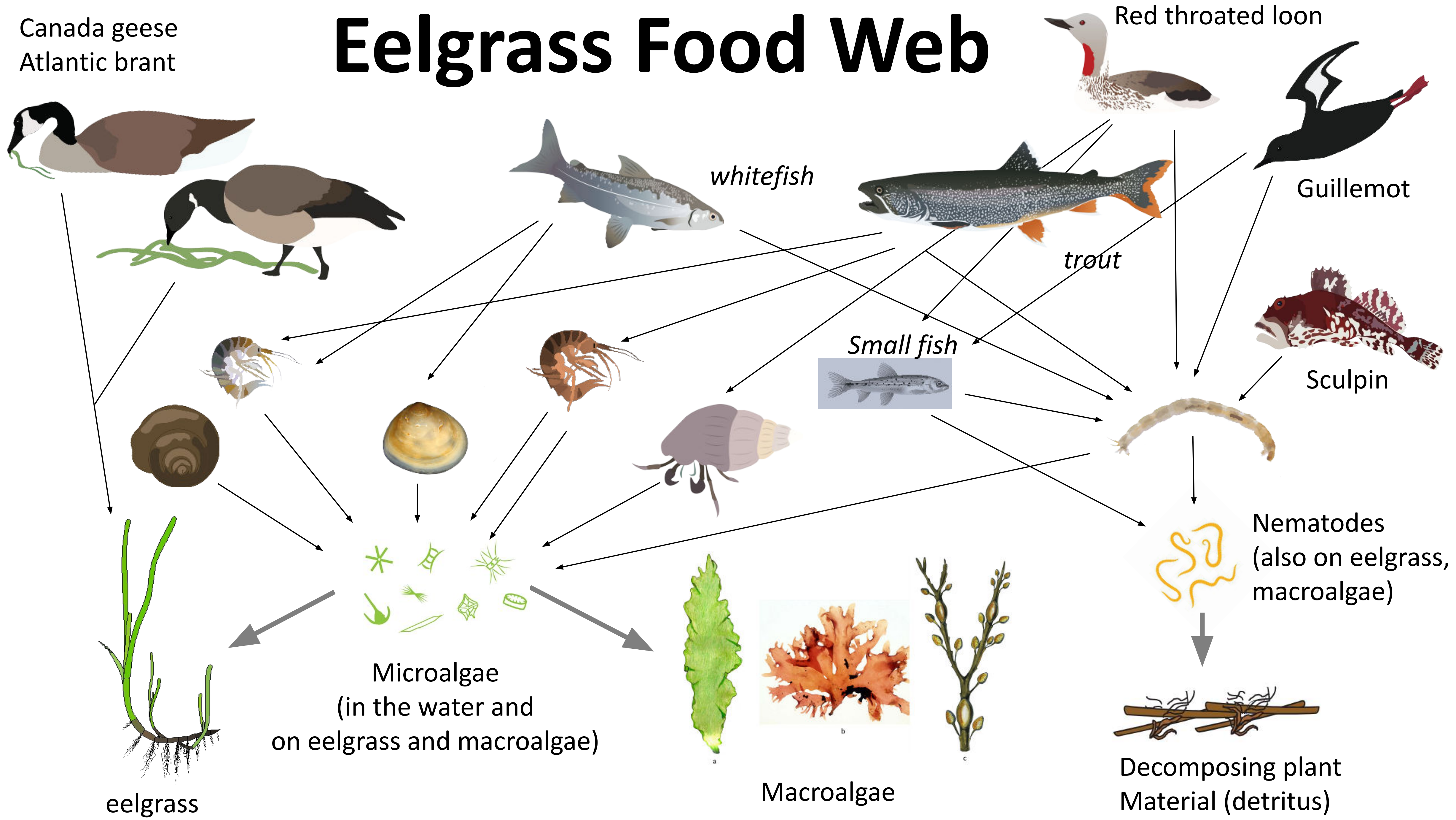
Eelgrass Food Web

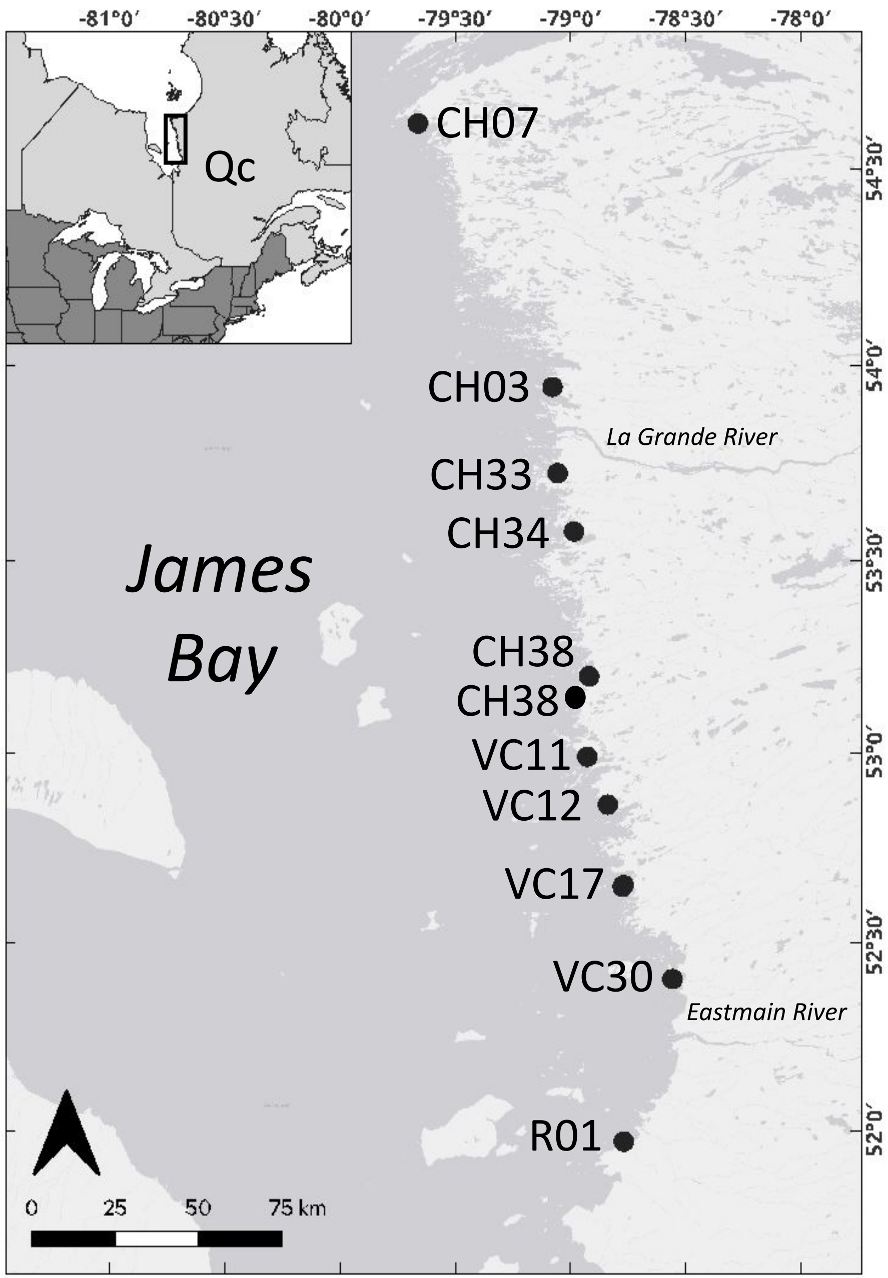


Eelgrass Food Web



Eelgrass Food Web

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Qc
CH07
CH03
La Grande River
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James Bay
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VC11
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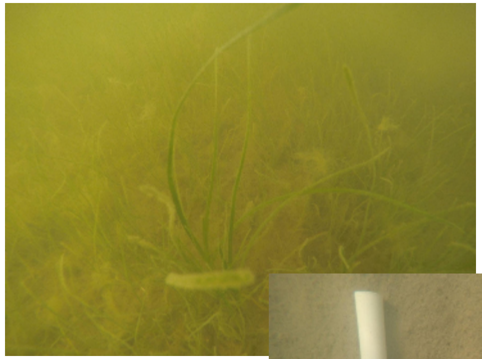
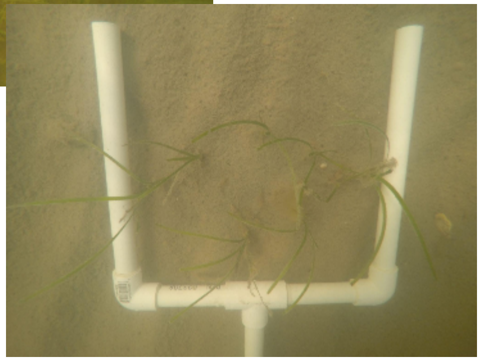
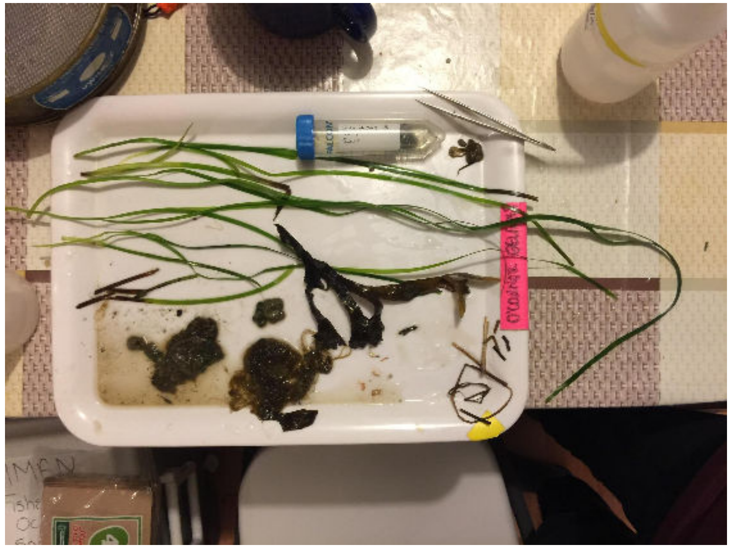
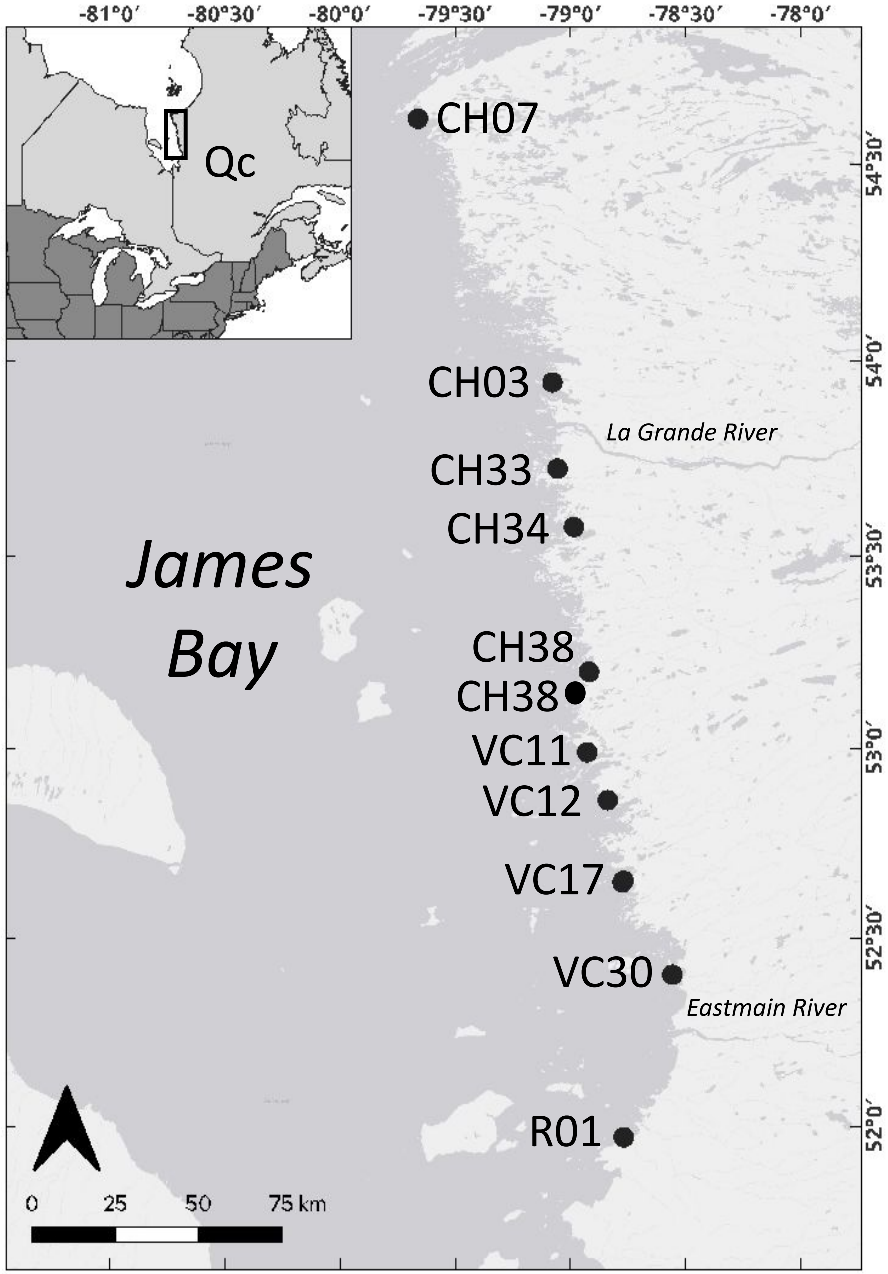
VC17
VC30
Eastmain River
R01
0
25
50
75 km



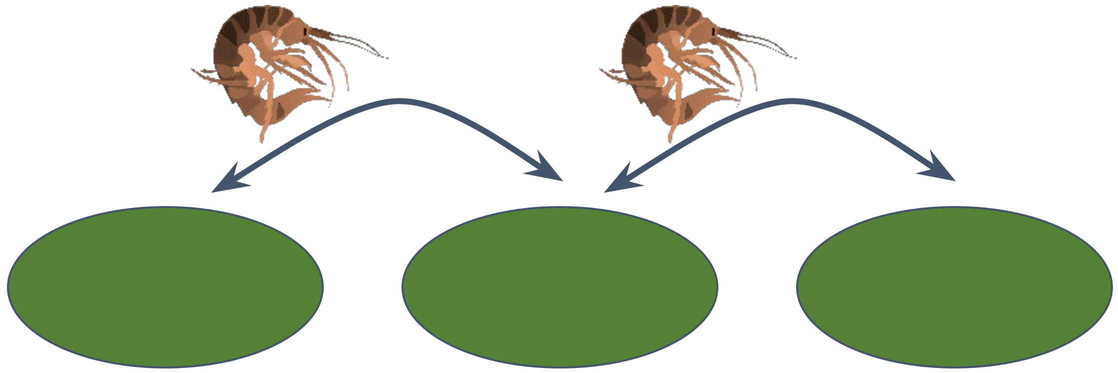
VC 12

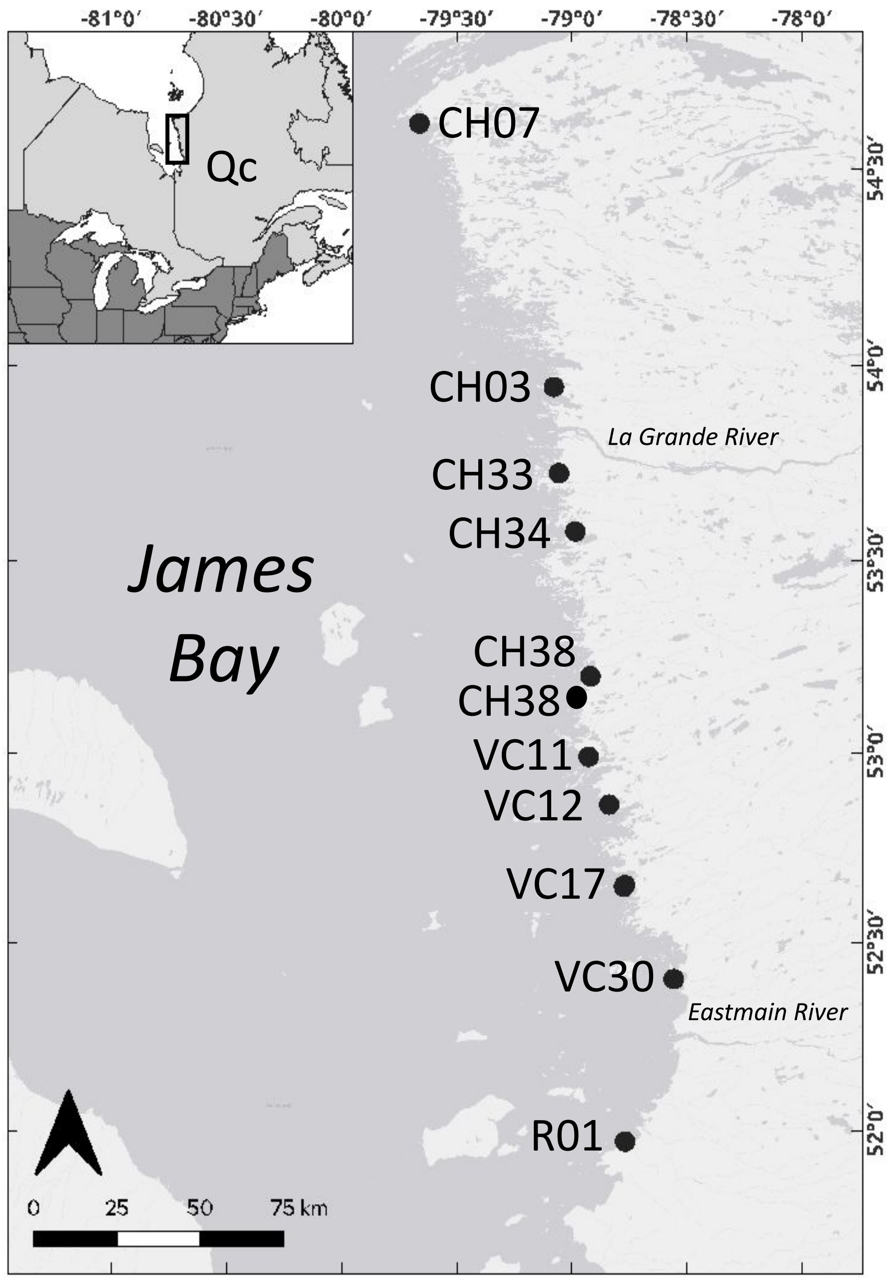


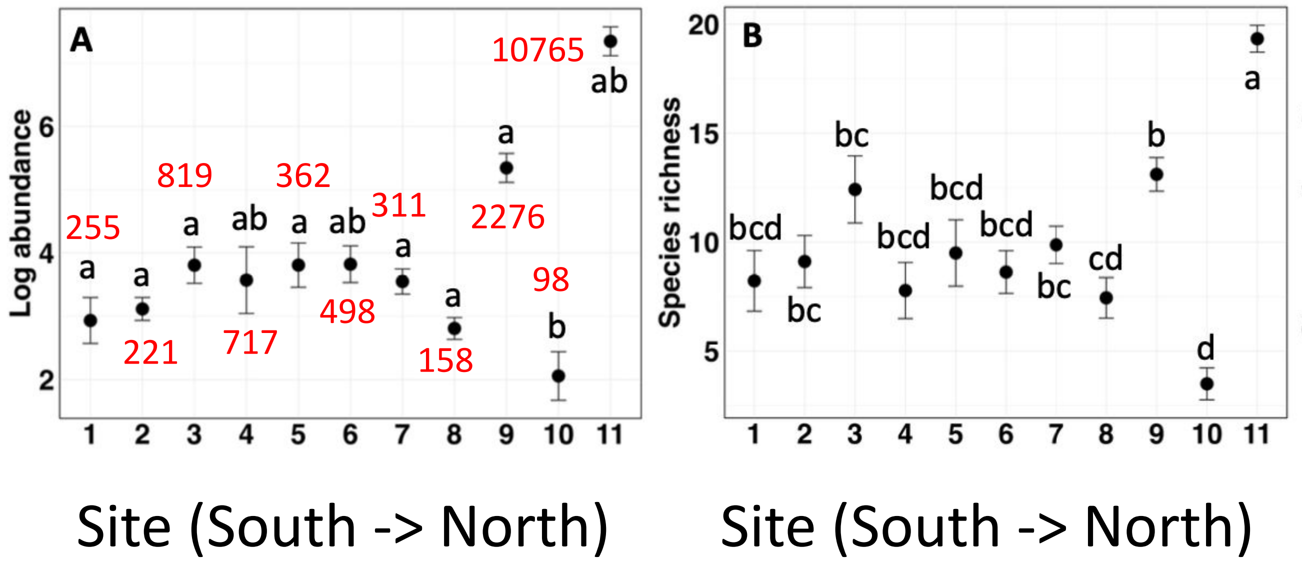




- 11 sites - our 'Dive sites' (from Waskaganish to Chisasibi, CH07)
- Counted invertebrates to estimate abundance
- Identified the species (at UBC)
- Calculated the epifaunal diversity (number of species)
- Assessed relationship between the environment and epifaunal abundance and diversity



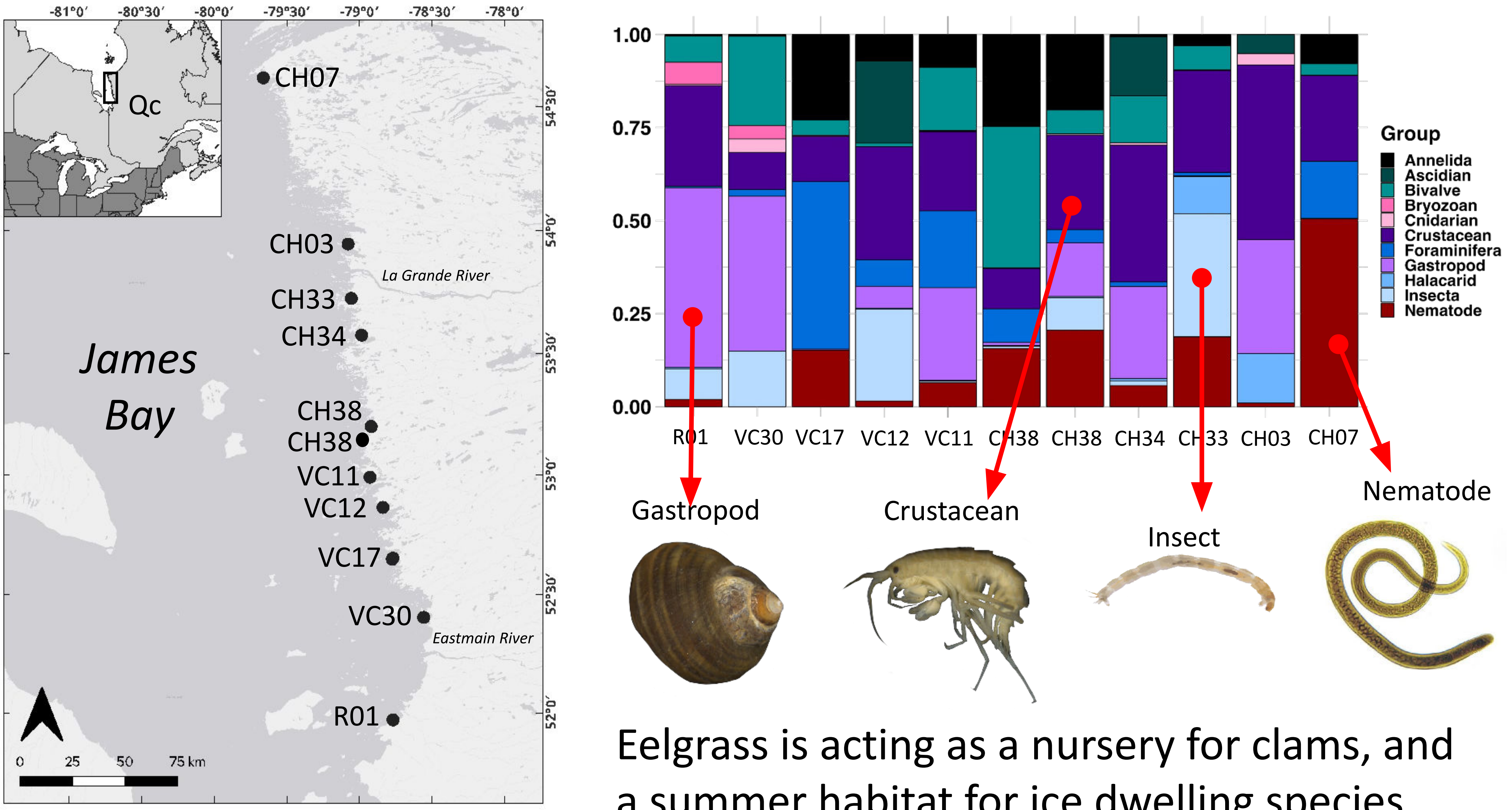




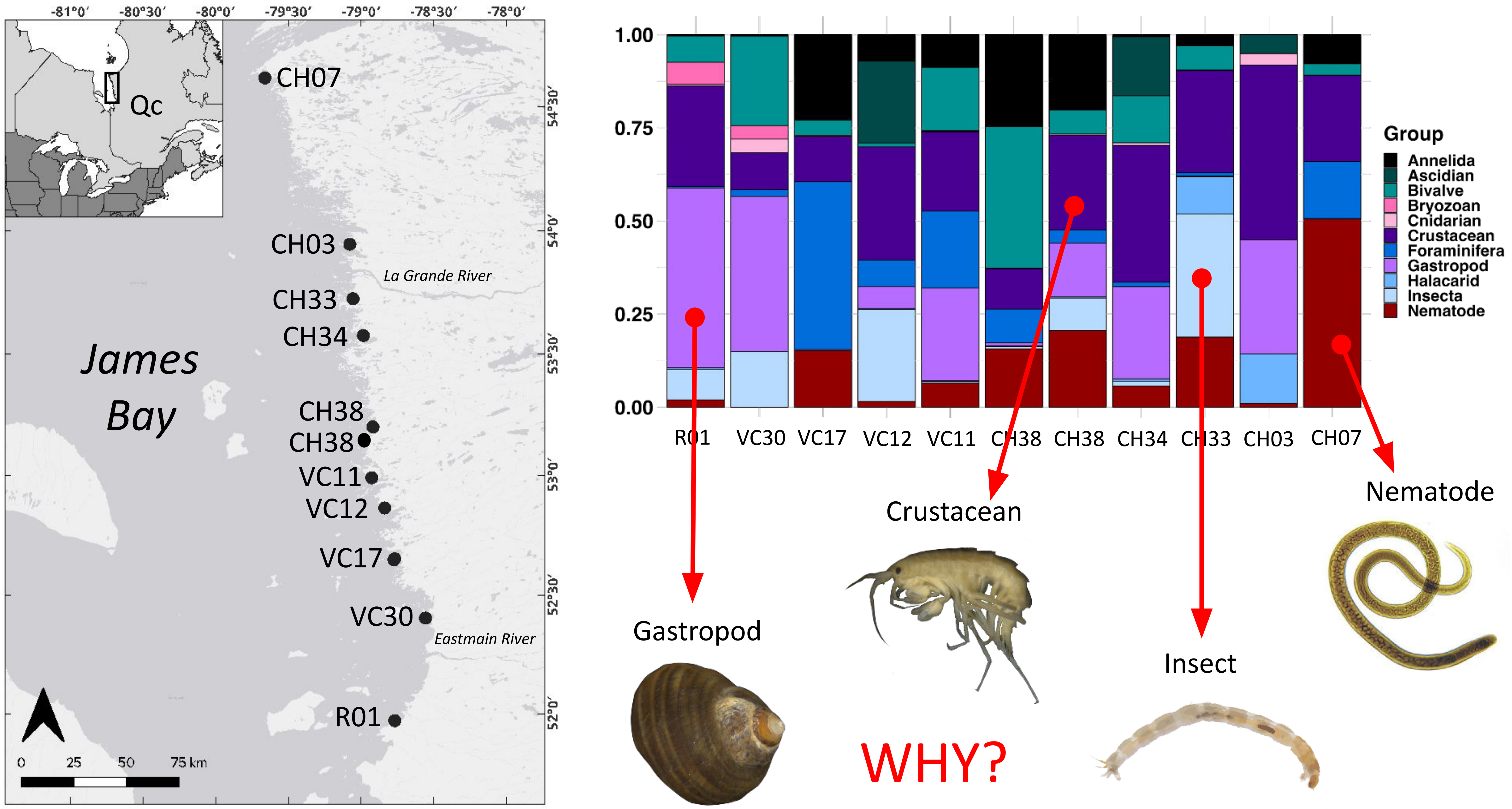
16,480 invertebrates collected and identified;

73 taxa, but each site had between 9 and 37 taxa

Most were rare - < 100 individuals



Eelgrass is acting as a nursery for clams, and a summer habitat for ice dwelling species



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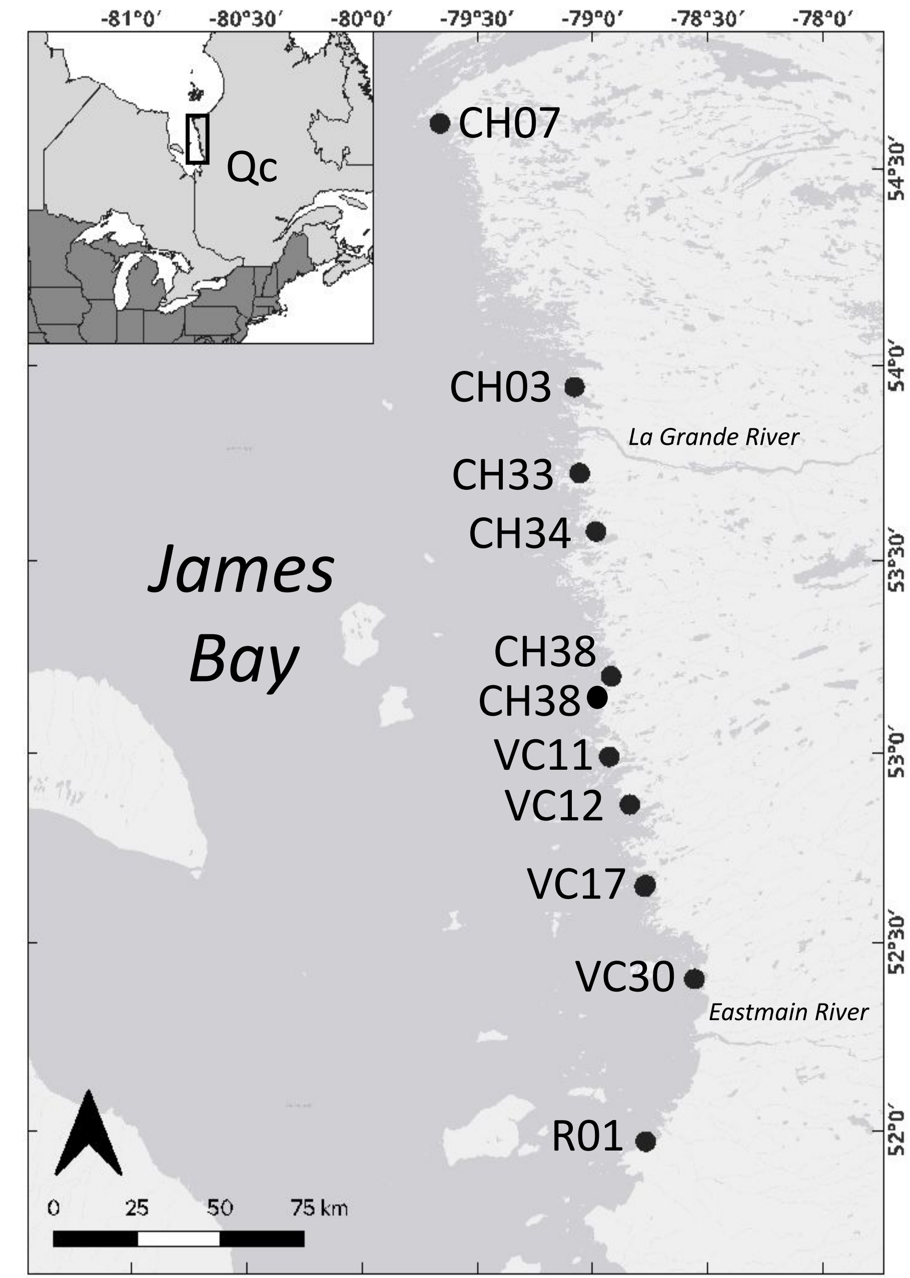
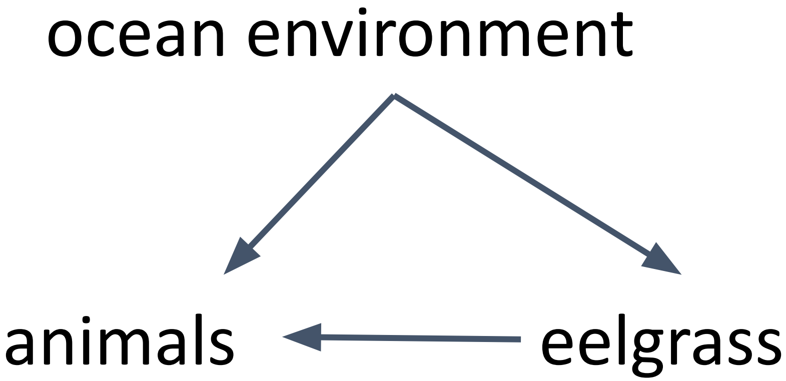
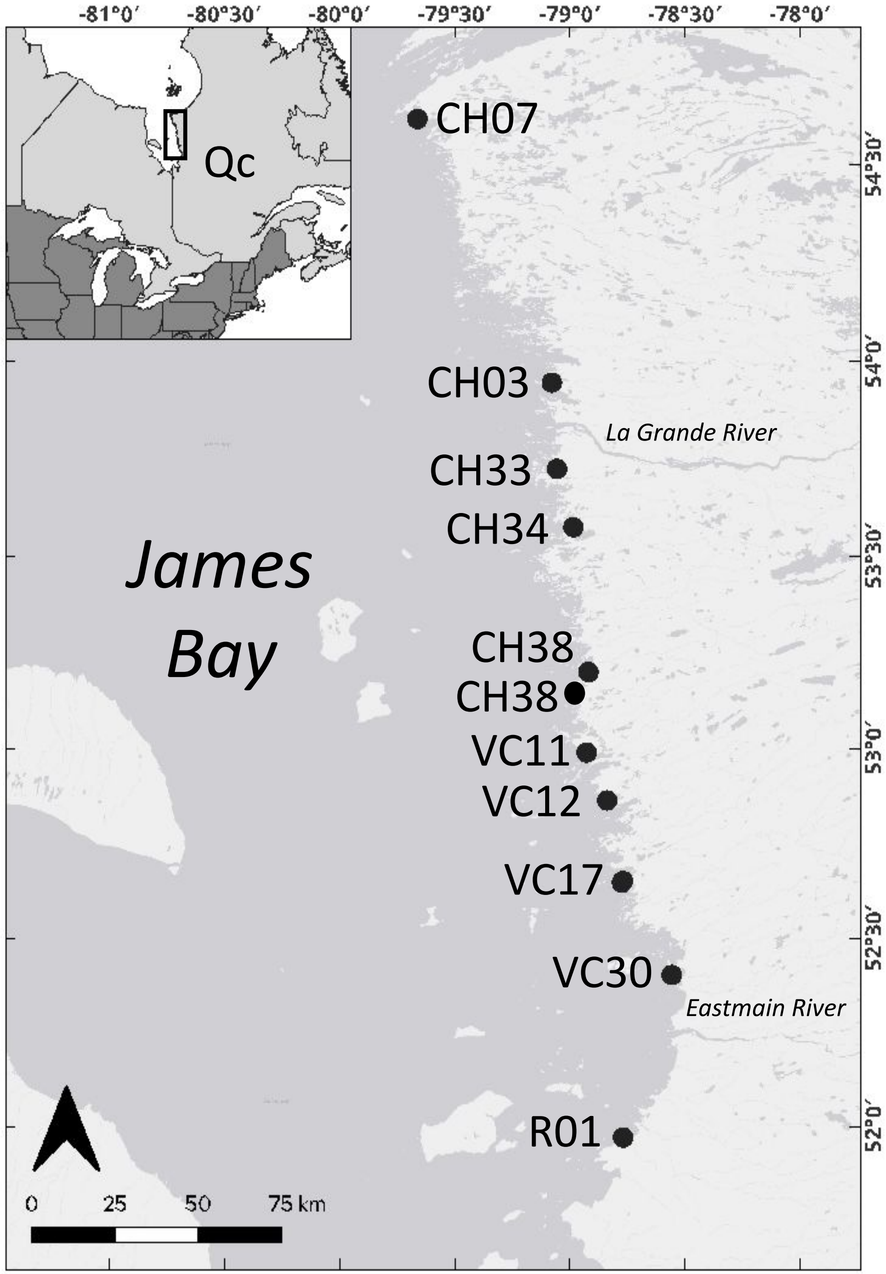
Qc
CH07
CH03
La Grande River
CH33
CH34
James Bay
CH38
CH38
VC11
VC12
VC17
VC30
Eastmain River
R01
0 25 50 75 km
1.00
0.75
0.50
0.25
0.00
R01 VC30 VC17 VC12 VC11 CH38 CH38 CH34 CH33 CH03 CH07
Group
Annelida
Ascidian
Bivalve
Bryozoan
Cnidarian
Crustacean
Foraminifera
Gastropod
Halacarid
Insecta
Nematode
Gastropod
Crustacean
Insect
Nematode
WHY?





Environmental conditions changes along the coast



Salty
High exposure to waves

High turbidity

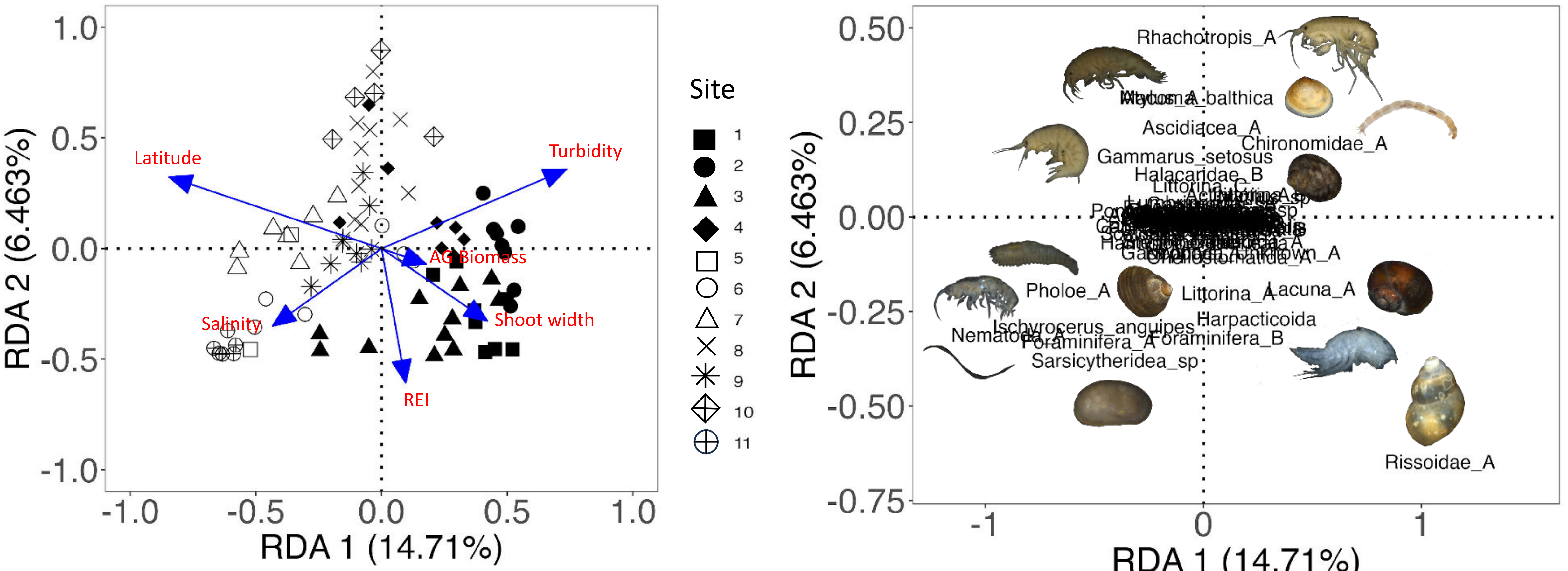
Lower salinity

High turbidity

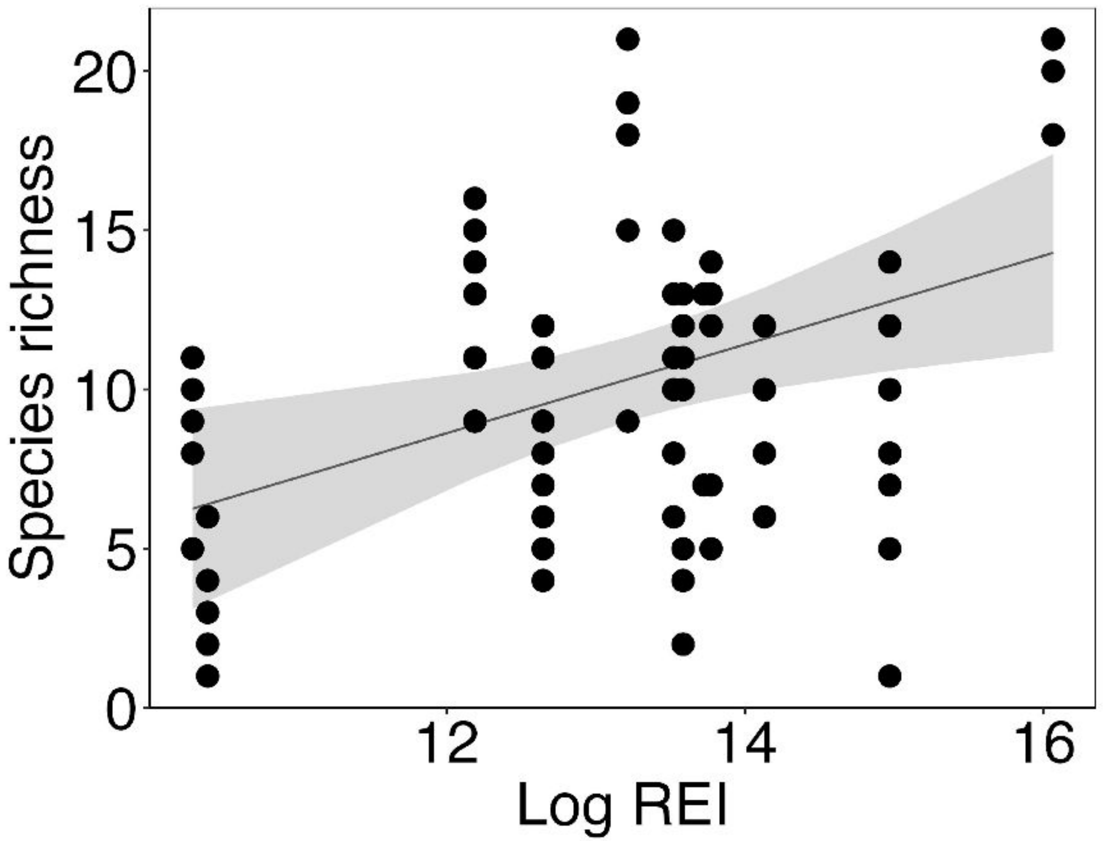
High exposure to waves

Wider shoots

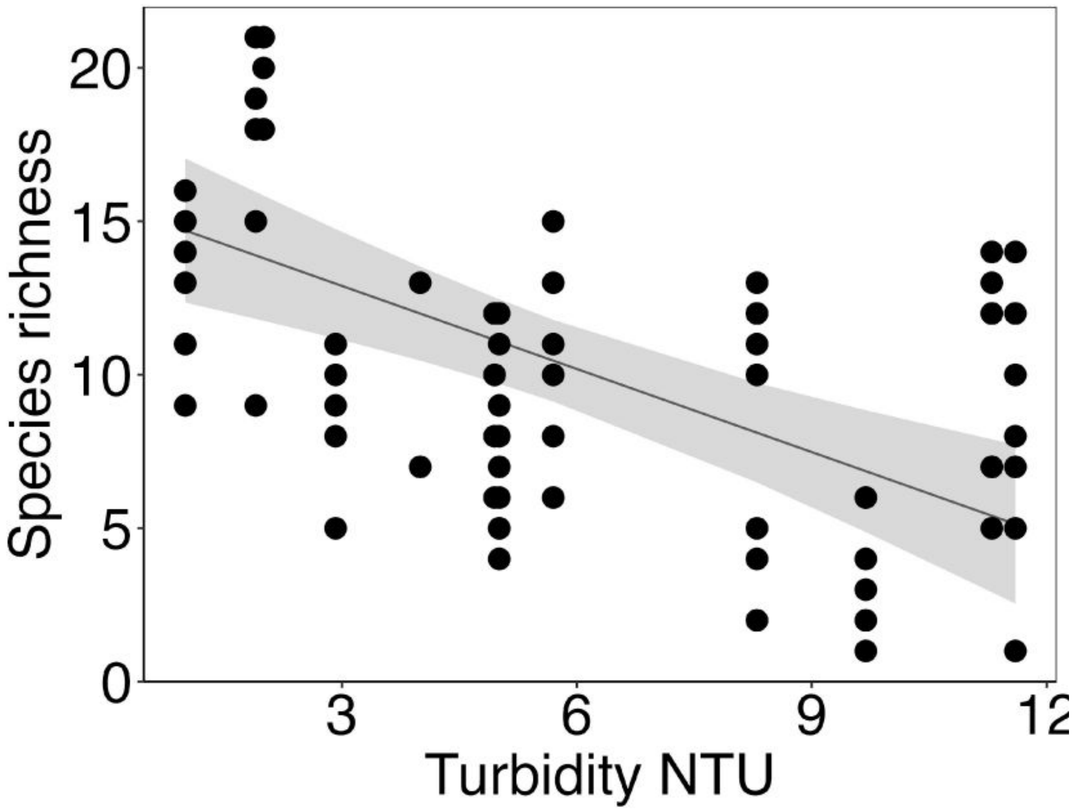
Environmental conditions changes along the coast



RDA 2 (6.463%)
RDA 1 (14.71%)
Latitude
Turbidity
AG Biomass
Shoot width
Salinity
REI
Site
1
2
3
4
5
6
7
8
9
10
11
Rhachotropis_A
Macoma_balthica
Ascidiacea_A
Chironomidae_A
Gammarus_setosus
Halacaridae_B
Pholoe_A
Littorina_A
Lacuna_A
Harpacticoida
Ischyrocerus_anguipes
Foraminifera_A
Foraminifera_B
Sarsicytheridea_sp
Rissoidae_A



exposure to waves



Cloudiness of the water

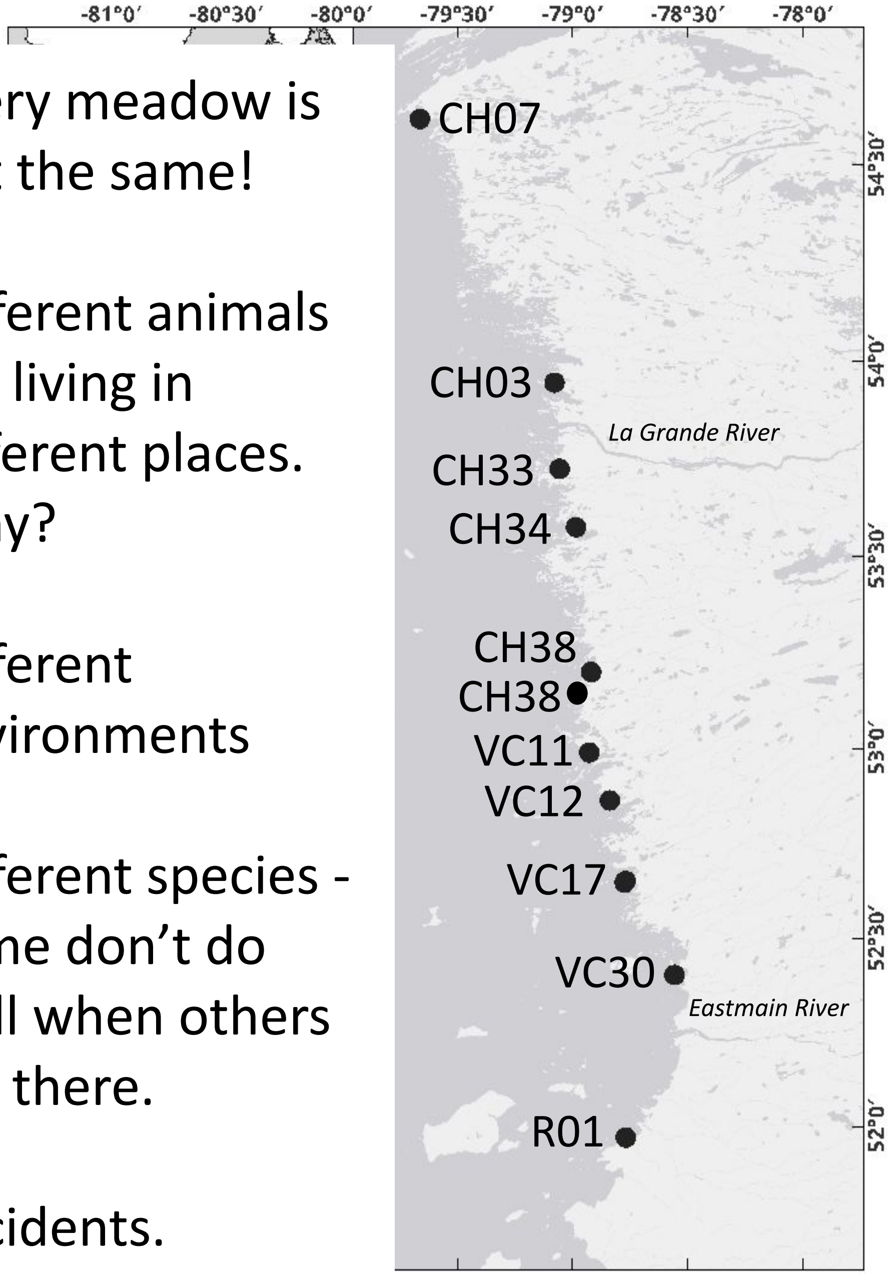
Every meadow is not the same!

Different animals are living in different places. Why?

Different environments

Different species - some don't do well when others are there.

Accidents.



Salty
High exposure to waves

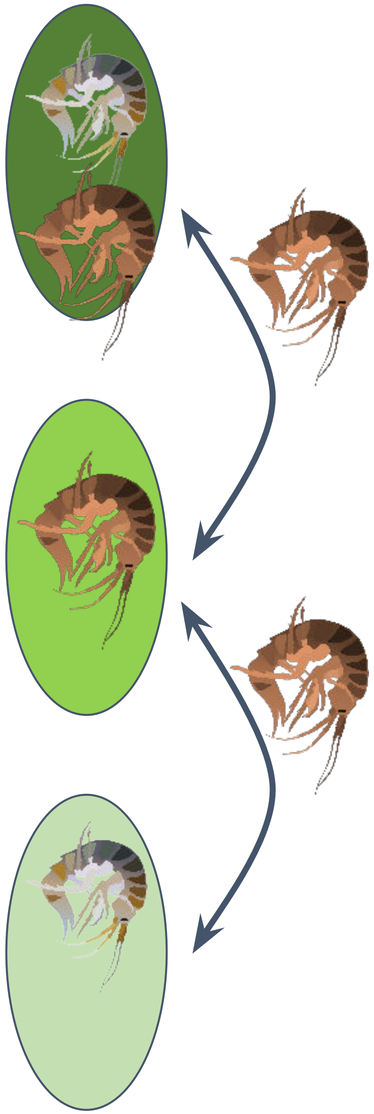
High turbidity

Lower salinity

High turbidity

High exposure to waves

Wider shoots



16,480 invertebrates

73 taxa, but each site had between 9 and 37 taxa

Papers from Eelgrass team from Phase I

1- Clyne et al. 2021 eelgrass mapping

2- Leblanc et al. 2022 Global Change Biology - historical data

3- Jeffries et al. accepted - Eelgrass Genetics in Canada

4- Davis et al. *in review* - light and nutrients

5- Fink-Mercier et al. *in review* - Why, how and who of the CHCRP

6- Leblanc et al. *in prep* - eelgrass associated invertebrate patterns (presented today)

7- Knight et al. *in prep* - note on James Bay eelgrass

8- Noisette et al. *in prep* - physiology paper (not sure...)

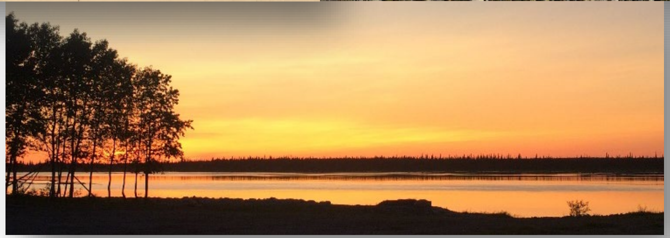
9- Kuzyk et al. synthesis paper (advanced draft)

(in bold - collaborative paper between research teams)

COast-JB

UQAR ISMER
Université du Québec à Rimouski
Institut des sciences de la mer de Rimouski





Coastal oceanography of eastern James Bay

Final report

Urs Neumeier, Michel Gosselin, Caroline Fink-Mercier, Simon Bélanger, Huixiang Xie, Simon Senneville, André Rochon, Jean-Carlos Montero Serrano, Rakesh Kumar Singh, Zélie Schuhmacher, Virginie Galindo

October 2023

Presentation outline

- Team & Acknowledgements
- Main findings
- Fieldwork
- Salinity
- Light availability and the factors influencing it
- Chlorophyll *a* and nutrients
- Water depth
- Modelling
- Seabed grain size, mineralogy, sediment cores
- Future steps

Multidisciplinary team

Urs Neumeier	Geology, moorings (leader)
Michel Gosselin	Biology (co-leader)
Simon Bélanger	Remote sensing
Huixiang Xie	Chemistry
Simon Senneville	Modelling (physical oceanography)
André Rochon	Geology (palynology)
Jean-Carlos Montero-Serrano	Geology (mineralogy)
Cédric Chavanne	Physical oceanography
Virginie Galindo	Coordinator (2017-2020)
Caroline Fink-Mercier	Coordinator (2021-2023)

Other team members

Involved students, research assistants, technicians, and collaborators :

Rémi Amiraux, Alexandra Aymard, Laélien Bassi, Michael Bianchi, **Manfred Desiré Bonga Nyetem**, Marie-Claude Bourboin, Christian Boutot, Bruno Cayouette, Marie-Hélène Carignan, **Rémi Costanzo**, Loic Dallaire, Constance Duffaud, **Amélie Évrard**, **Valentin Gaillardon**, Yannick Grégo, Kaushik Gupta, **Raphaël Mabit**, Constance Marty, Amy McMackin, Fanny Noisette, Chloé Pelletier, Eloïse Pelletier, Lou Richer, Zélie Schuhmacher, Atif Waqas (fieldwork).

Pascal Rioux (nutrient analysis), Mélanie Simard (HPLC analysis), Claude Belzile (DOC analysis), Pascal Guillot (processing the CTD data), Vincent Lévesque, Simon Faye and Zélie Schuhmacher (grain size analysis), Karolyne Beauchamp and **Myriam Caron** (mineralogy analysis), **Marine-Anne Baudin** (pigment analysis), Raphaël Mabit, Alycia Boismenu, **Félix Lachapelle**, **Daniela Walch** and **Rakesh Kumar Singh** (remote sensing), Simon Wally Faye (preparing the palynology samples), Fatma Dhifallah, **Marine-Anne Baudin** et Cahterine Lalande (Biology), **Yijie Li** (Chemistry), Nicolas Van Nieuwenhove (analyzing the palynology slides,University of New Brunswick), Jean-François Hélie and Agnieszka Adamowicz-Walczak (isotopes and C/N analysis).

Acknowledgements

We are grateful to **Marc Dunn** and **Alain Tremblay** for the project coordination, **Ernie Rabbitskin**, **Géraldine Mark** and **Norman Cheezo** for their presence and involvement in the coordination of the sampling with land users from Chisasibi, Wemindji and Eastmain, respectively, and **Laura-Lee Sam** for her precious help in the laboratory.

We would like to thank Leonard Asquabaneskum, Patrick Atsynia, Rene Atsynia, Chris Bearskin, Wilfred Cheezo, Ryan Coopishish, Brian Fireman, James E. Georgekish, Allen Gull, Gerald Herodier, Christine House, Eric House, Ernie Hughboy, Billy Kakbat, David Kakabat, Brian Kanatewat, Louis Kanatewat, Merlin Kanatewat, Gordon Kitty, Dale Louttit, Derek Moar, Bobby Napash, Lawrence Napash, Willard Napash, David Pepabano, Jean-Paul Pepabano, William Pepabano, John Rupert, Keith Rupert, Ronnie Rupert, David Sam, Jeremy Rabbitskin, Glen Salt, John E. Sam, Henry Sealhunter, Frederick Shem, Angela Stewart, Henry Stewart, Elmer Visitor, Judy Washipabano and many others for their guidance on the bay and their enthusiasm in the project.

This work was funded mainly by **Niskamoon Corporation**, but also by the Natural Sciences and Engineering Research Council of Canada (**NSERC**), and the Fonds de recherche du Québec – Nature et technologies (**FRQNT**) through the **Québec-Océan** research cluster.

Main findings

- Optically active constituents (mainly CDOM and SPM) show a distinct south-north trend, with southeastern James Bay having higher concentrations and generally less light available for photosynthesis.

- The derivations of the Eastmain, Caniapiscau and Rupert rivers increased the freshwater discharge of the La Grande River, especially in winter. Consequently, the La Grande plume increased in size compared to 1976, extending now from Dead Duck Bay to Bay of Many Islands in winter (isohaline 5 psu).

- The freshwater discharge to the eastern James Bay has increased from 1981 to 2023 by 15 % due to an increase in net precipitations on the watersheds. This increase resulted in more "colored" water (more terrigenous or riverine CDOM).

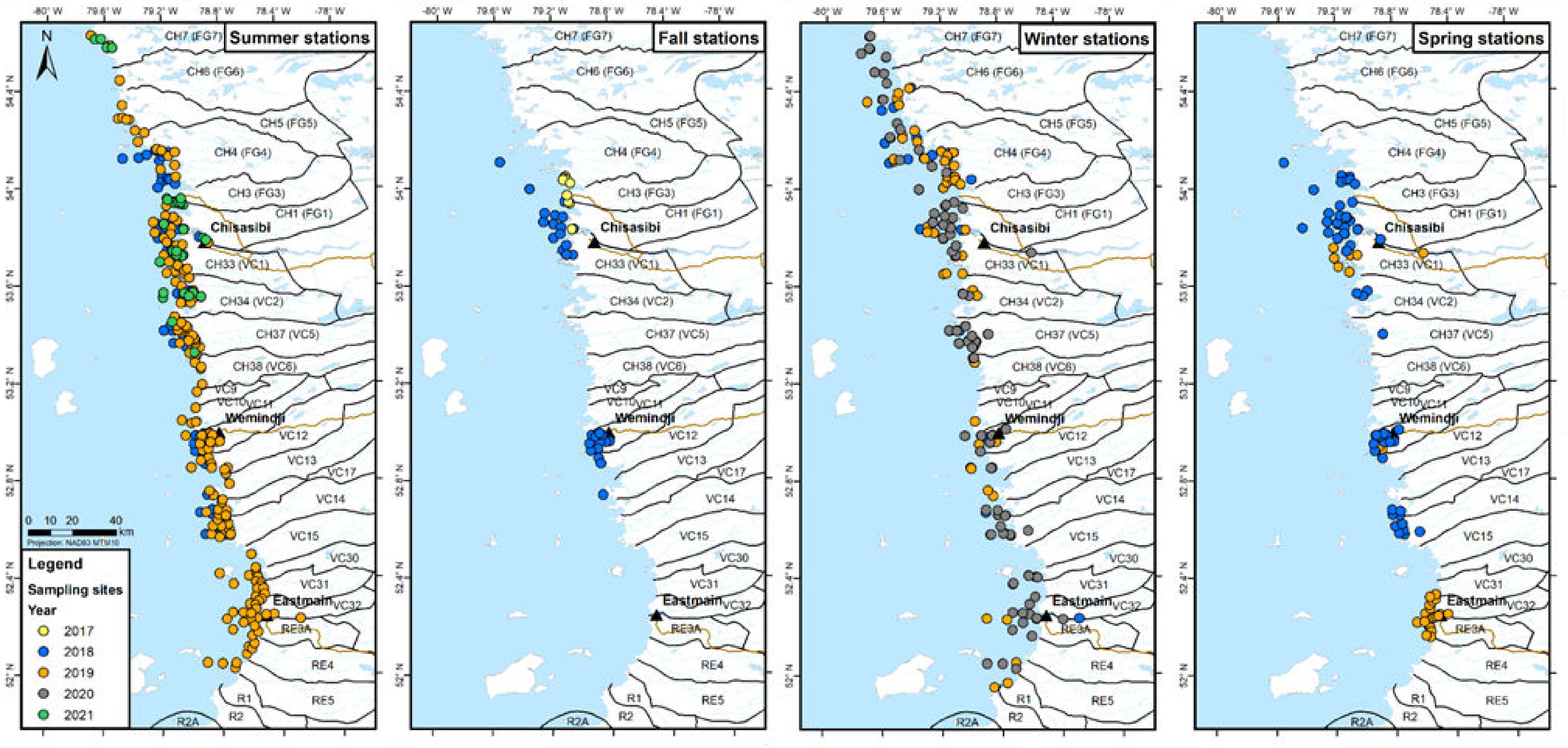
Field campaigns

Year	Season	Date	Number of stations
2017	Fall	October 16 – 28	9
2018	Winter	March 1 – 13	62
	Spring	June 20 – July 8	52
	Summer	August 1 – 18	69
	Fall	September 10 – 30	30
2019	Winter	February 23 – March 14	92
	Spring	June 17 – July 3	47
	Summer	July 3 – August 16	130
2020	Winter	February 25 – March 16	81
2021	Summer	June 14 – August 20	161

Total number of station visits: 733

Number of different stations: 245

Visited stations in the 10 field campaigns



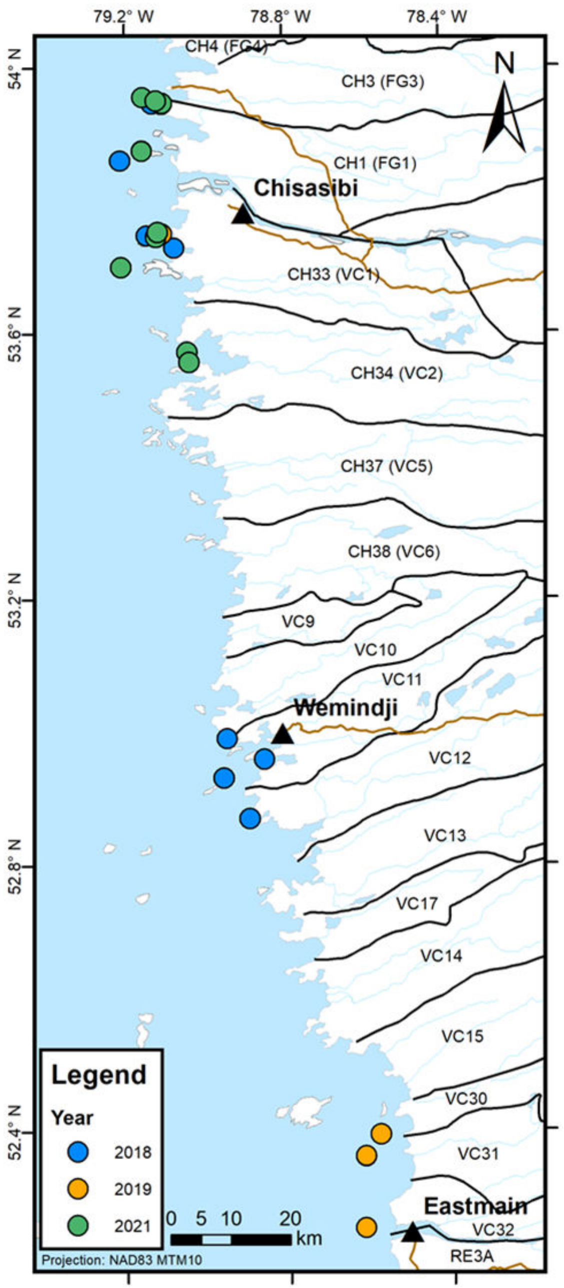
Other data sources

- Moorings: installed in summer for 1-3 months, recording mainly salinity, temperature, and tides, but some recording also light or currents.

- Bathymetry surveyed with freighter canoes.

- Remote sensing data from
  MODIS sensor onboard the Aqua satellite and
  MultiSpectral Imager sensor onboard the Sentinel-2 satellite.

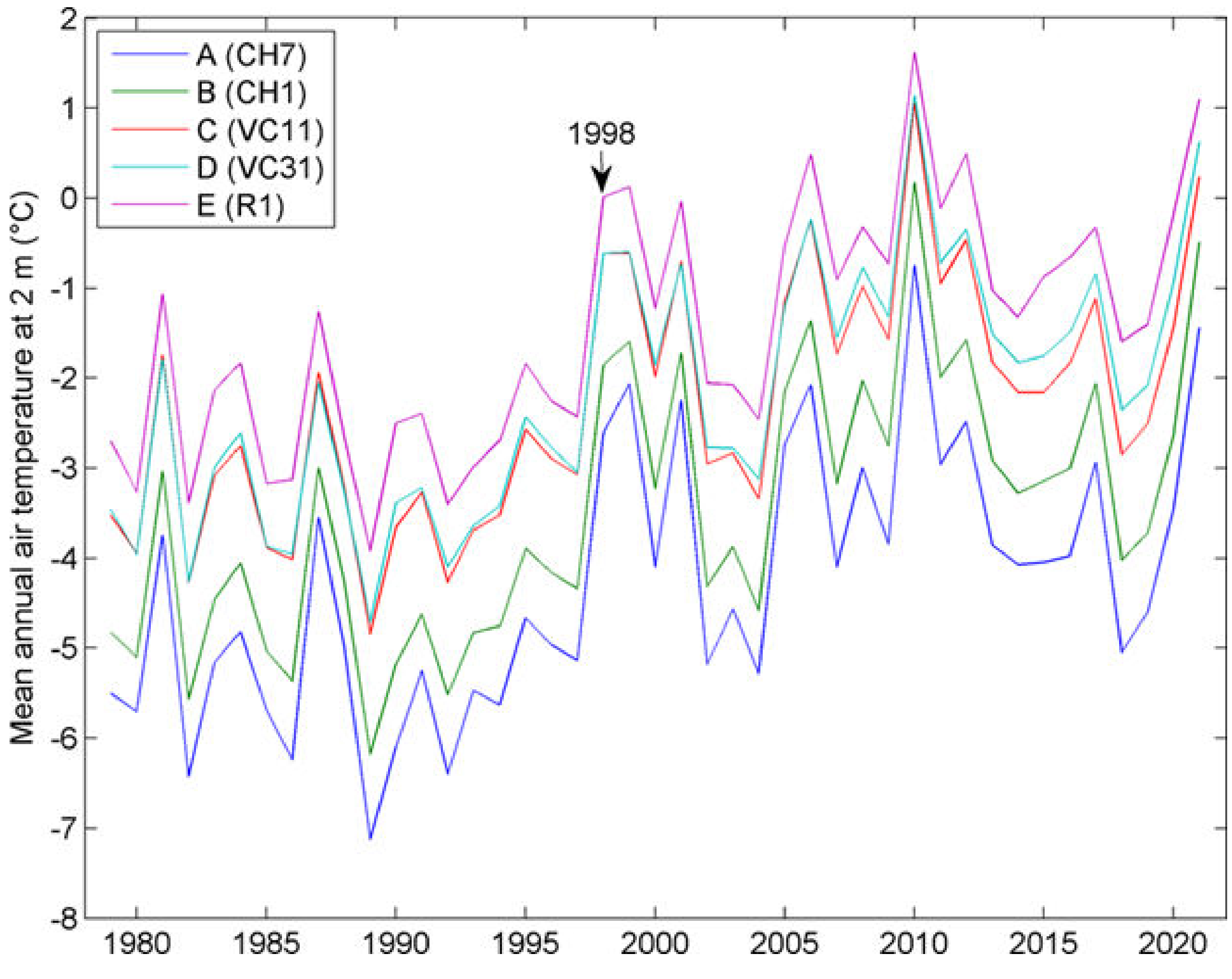
- ERA5 reanalysis model for air temperature and precipitations.

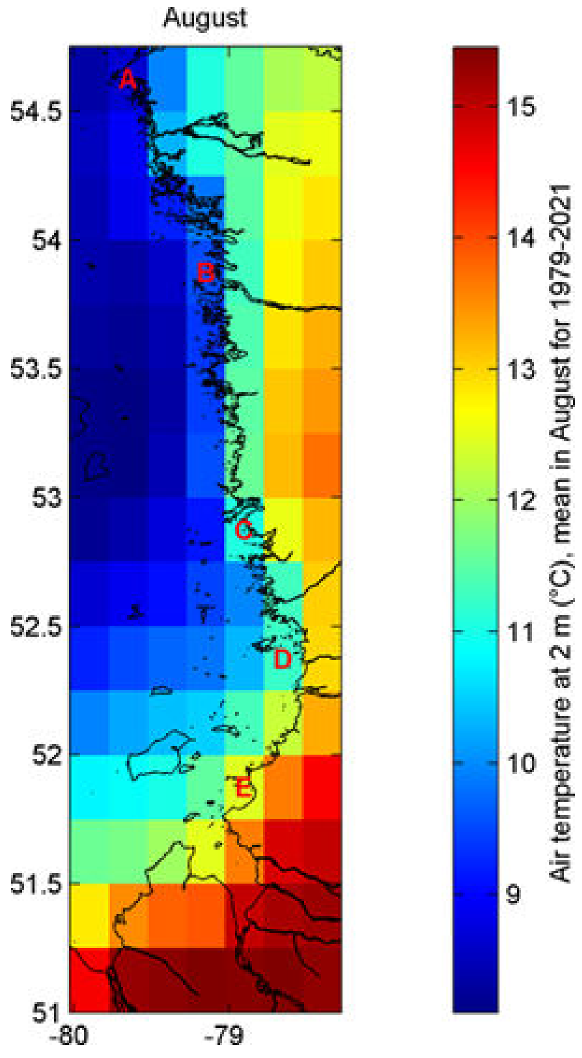


Map of moorings

Air temperatures 1979-2021

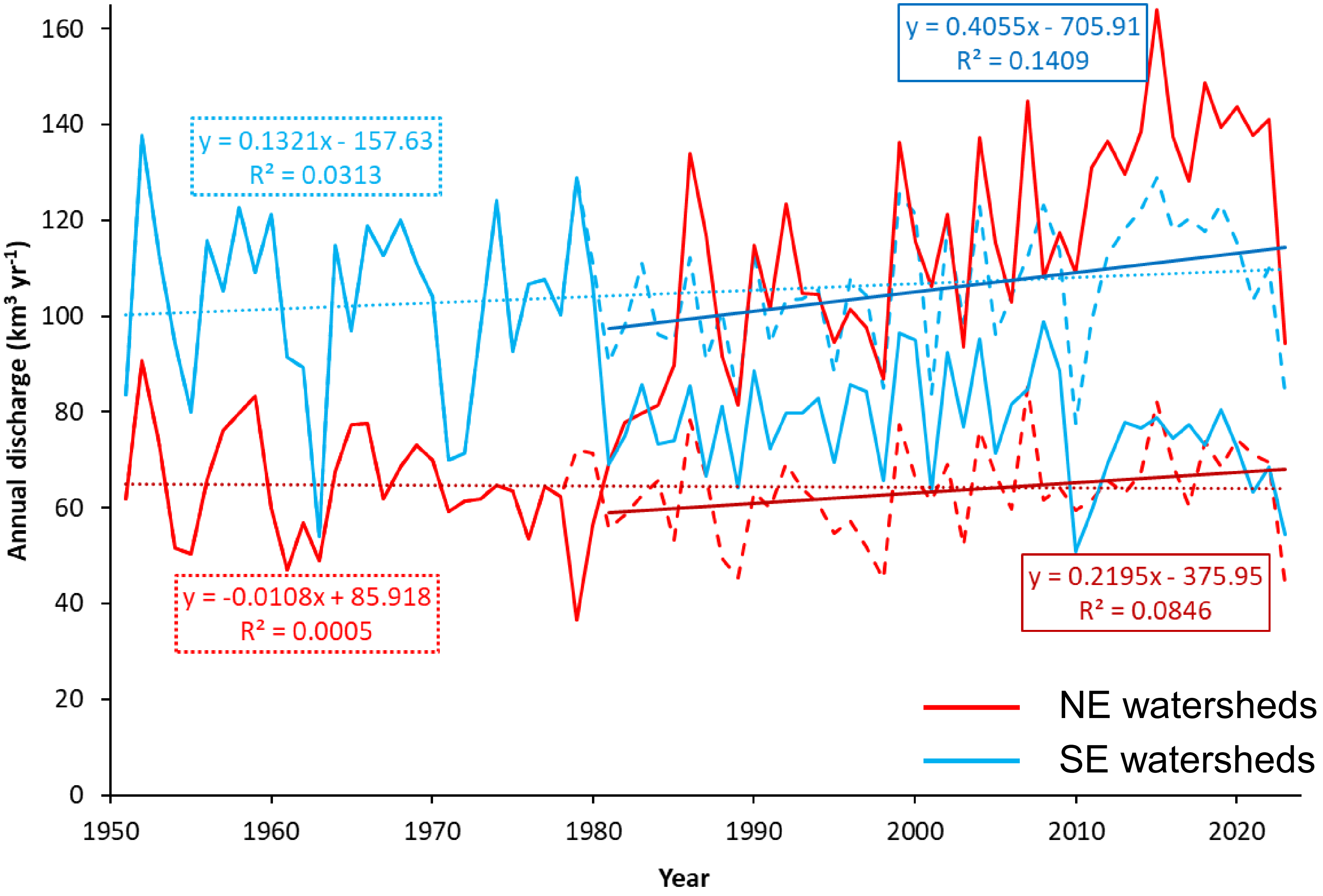
From ERA5 reanalysis





Annual freshwater discharge to James Bay

modelled with ERA5 net precipitations



HQ dams have diverted ~43 km³/yr from Eastmain and Rupert rivers and ~25 km³/yr from Caniapiscau River to the La Grande River.

From 1981-2023, discharge of eastern watersheds increased by 15.5 % due to an increase in net precipitations.

Scenario without river derivation and reservoirs

NE watersheds

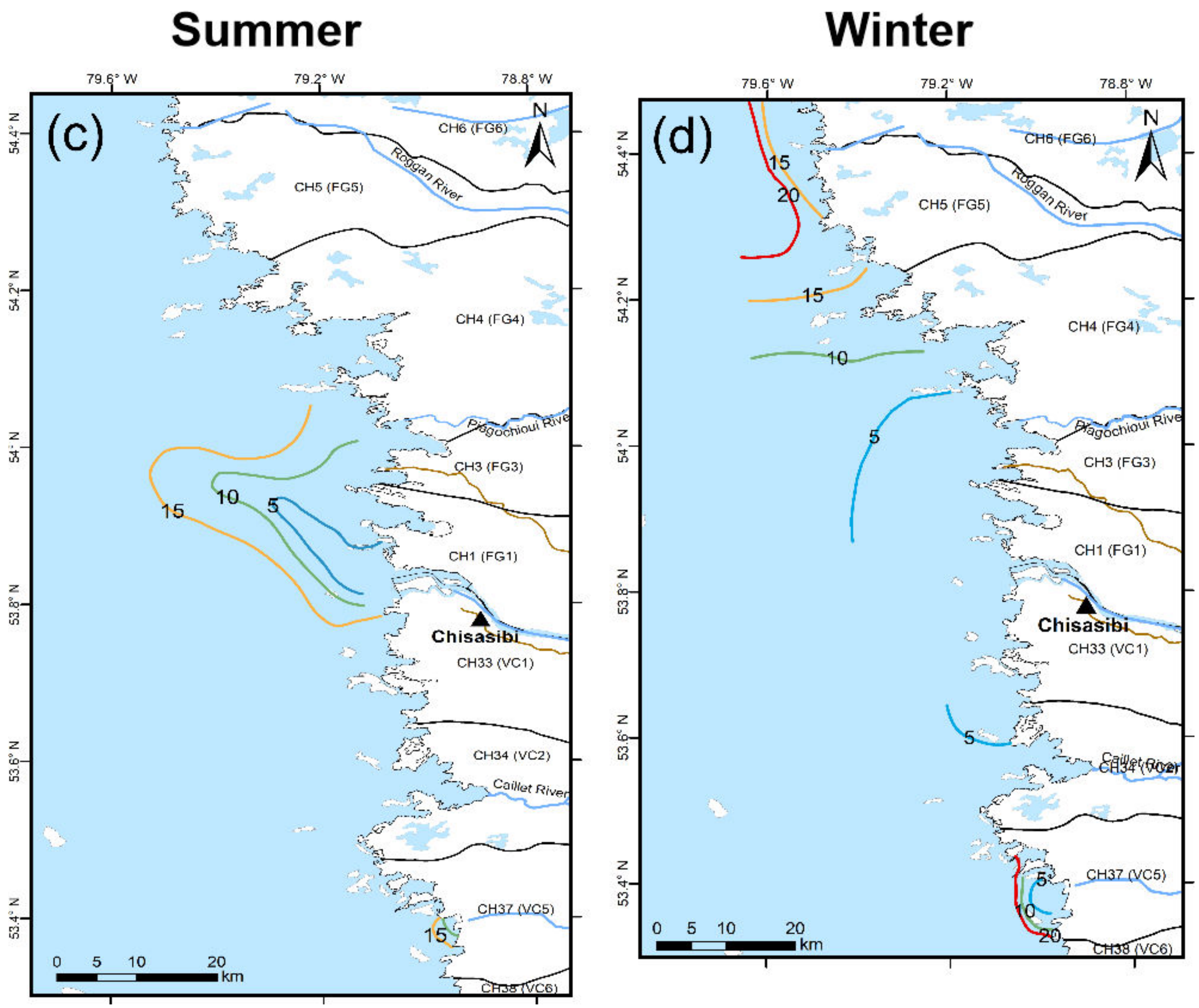
SE watersheds

Salinity

The water column is stratified: a bottom layer with salinity > 22 psu, and a surface layer (1 to 6 m thick) with salinity between 0 and 20 psu.

The La Grande River discharge and plume size have increased since 1976, specially during the winter when the core plume (salinity < 5 psu) now extends from Dead Duck Bay to Bay of Many Islands.

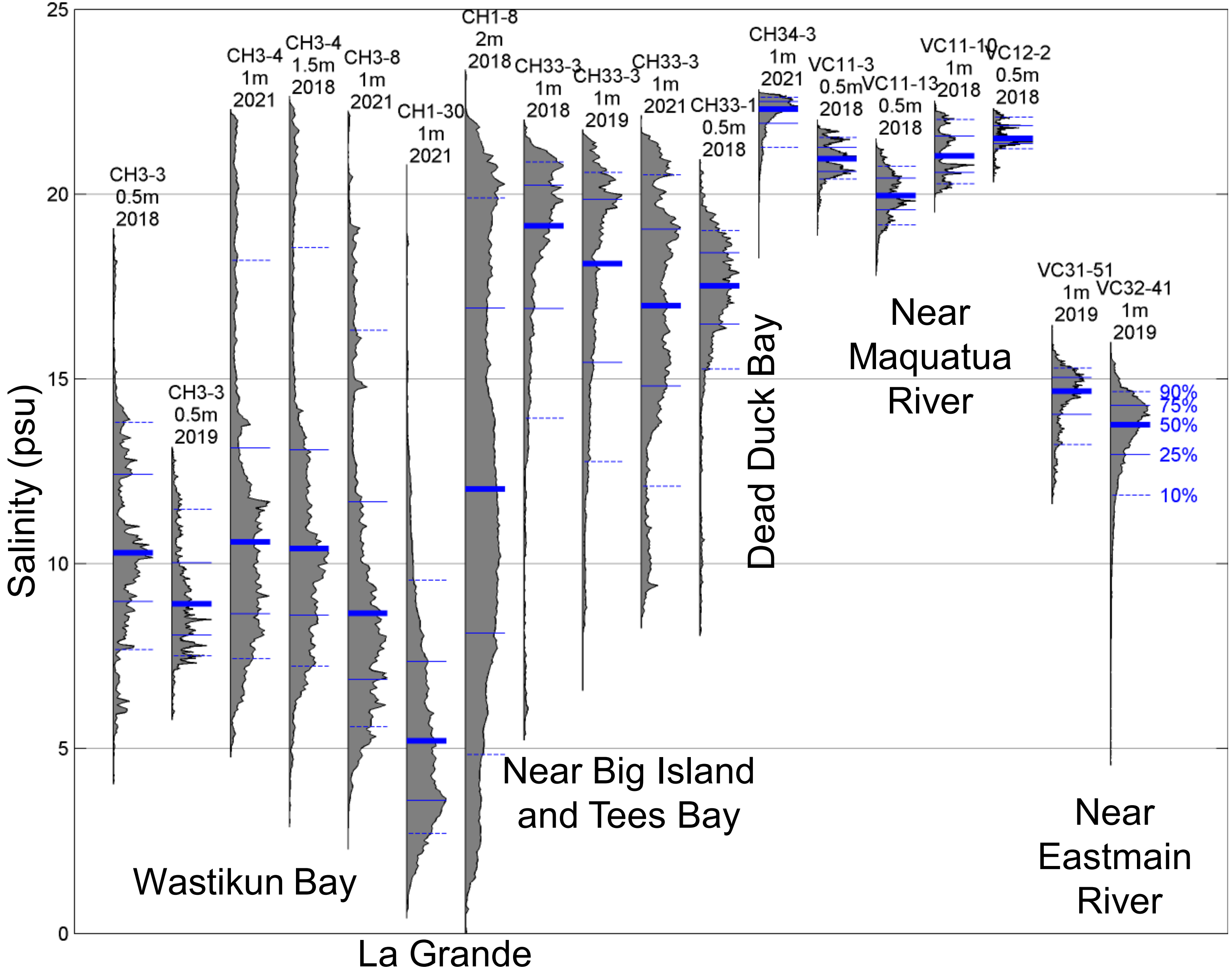
However, the northward extension is relatively stable since 1987.



Salinity

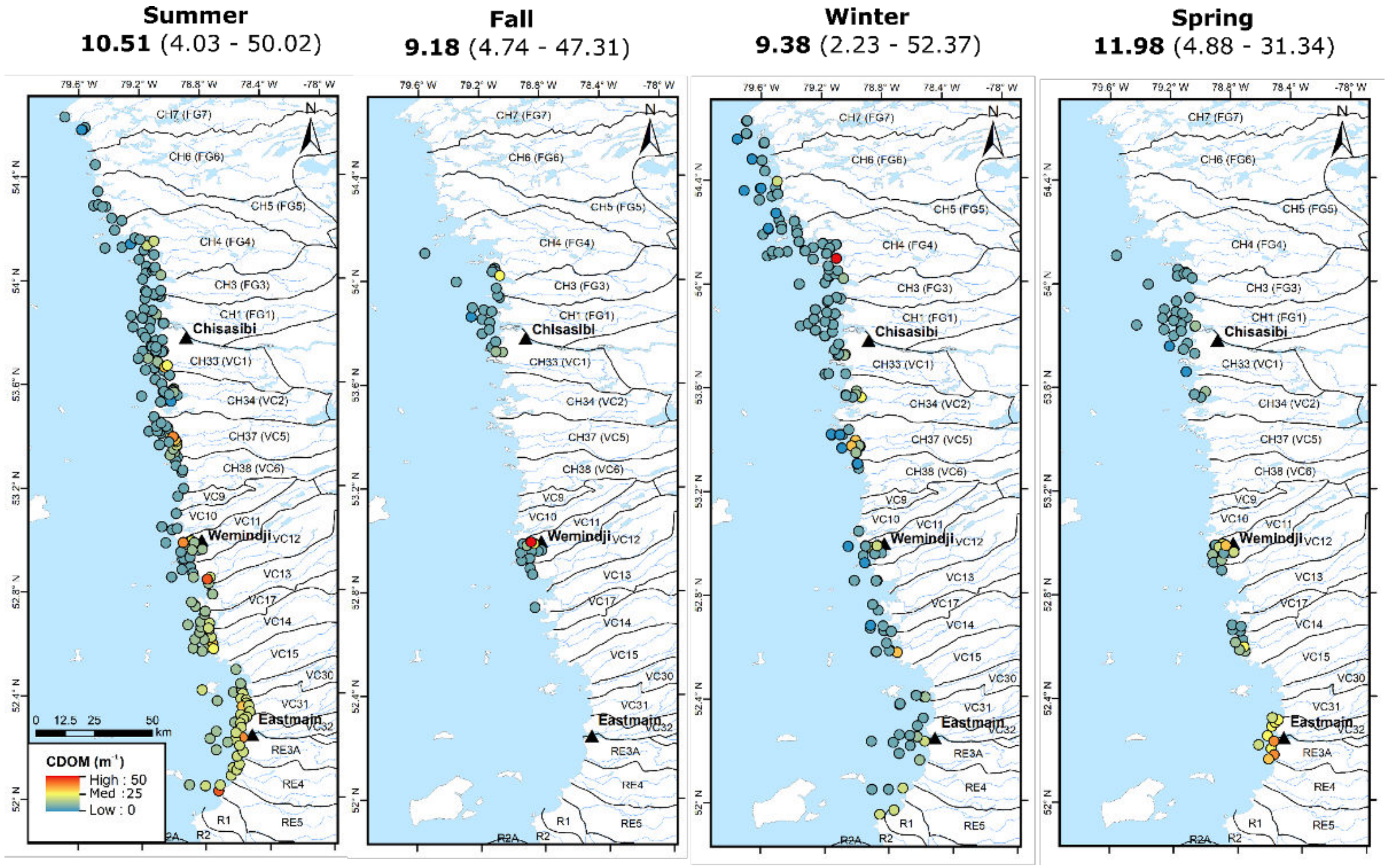
At a shorter temporal scale, surface salinity varies over the summer, with some sites exhibiting up to 5-fold variations.

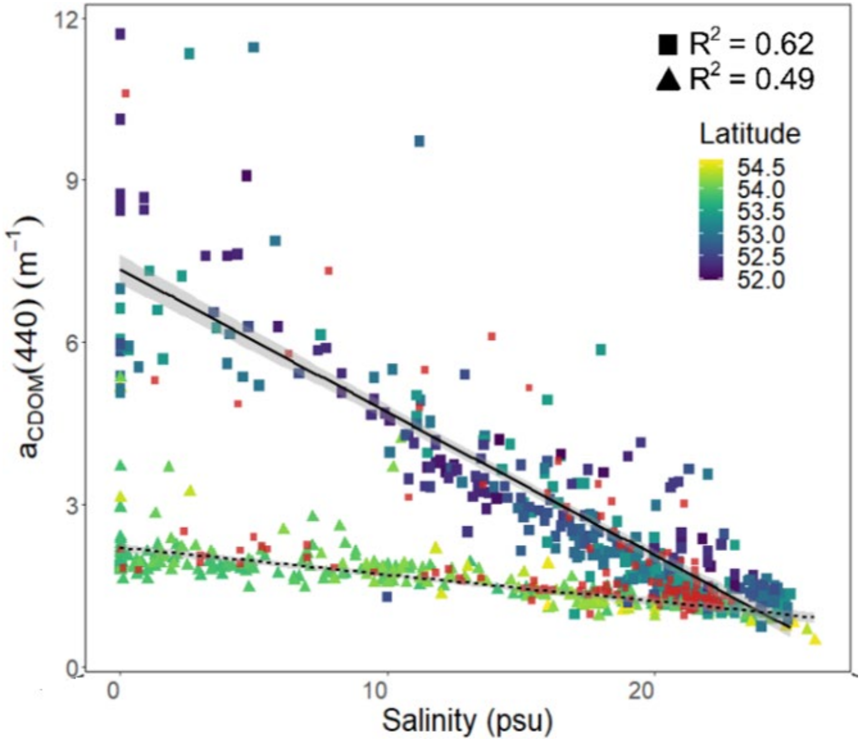
Lower surface salinity is frequent north of the La Grande River.
It is less frequent in Tees Bay or near Eastmain River.



Colored dissolved organic matter (CDOM)

There is a general south-north trend, with higher CDOM concentration in southeastern James Bay, especially in spring and summer.



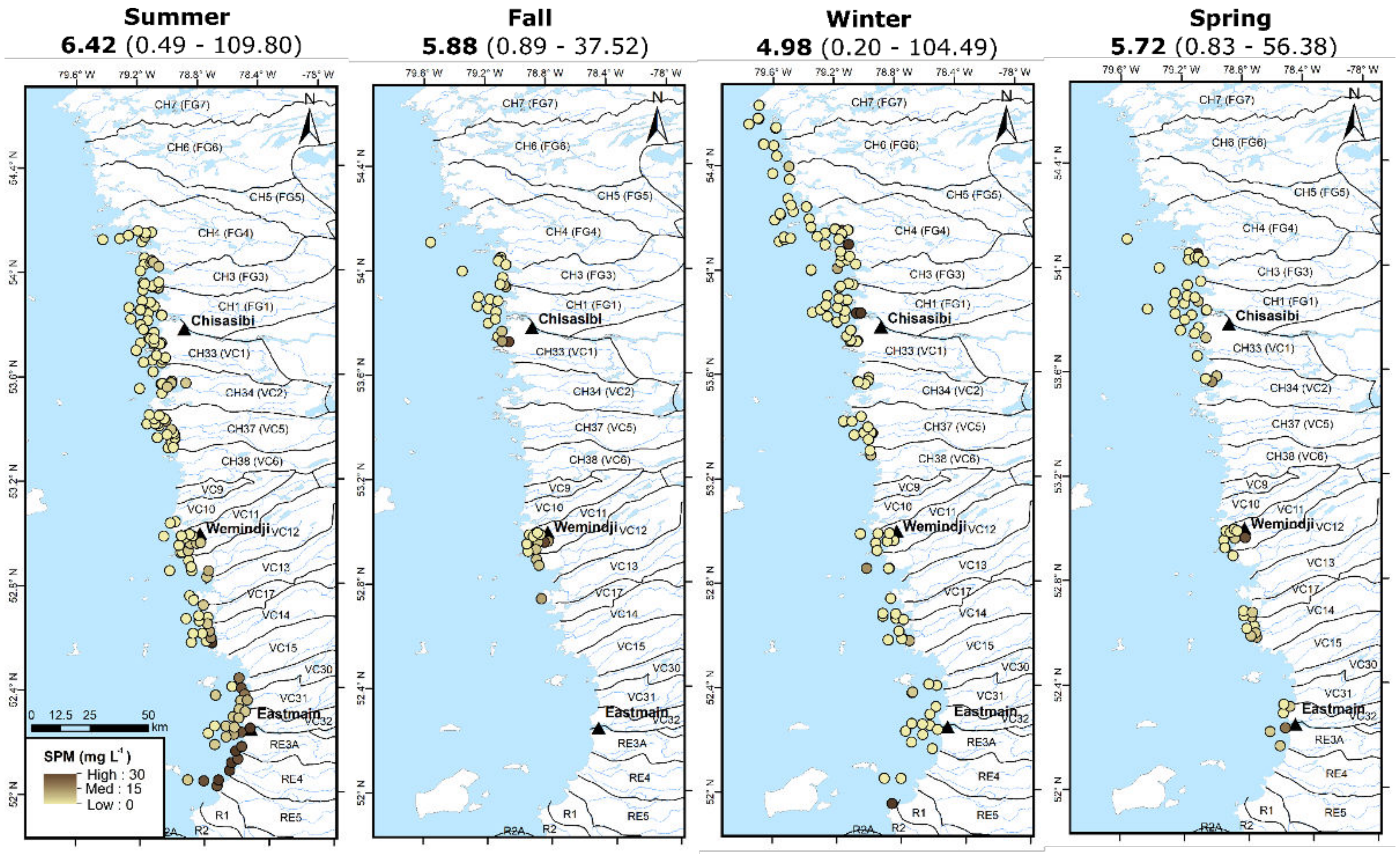


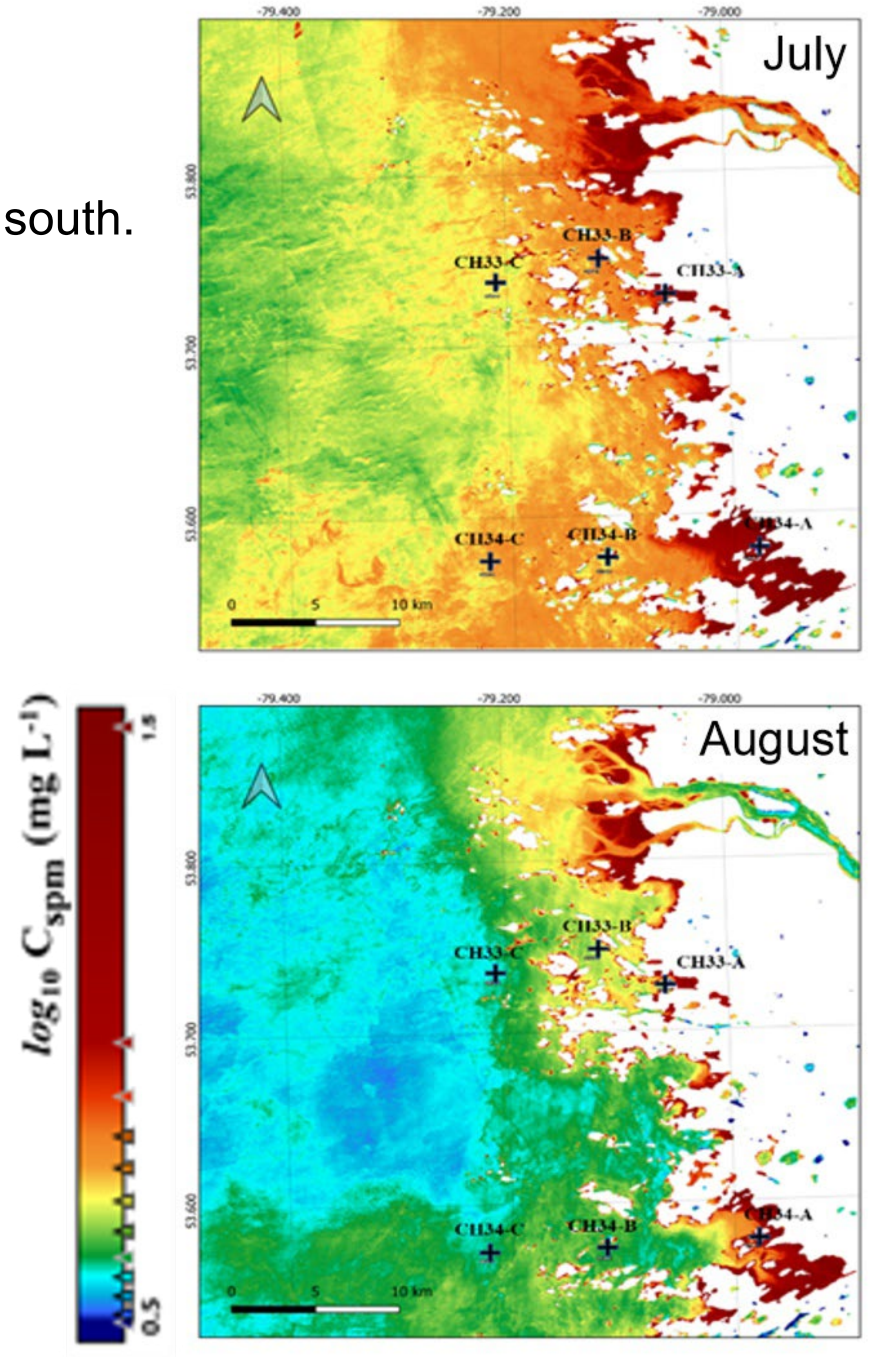
Fresh water is enriched in CDOM, and CDOM concentration decrease further away from river mouth.

The La Grande River is only slightly enriched in CDOM.

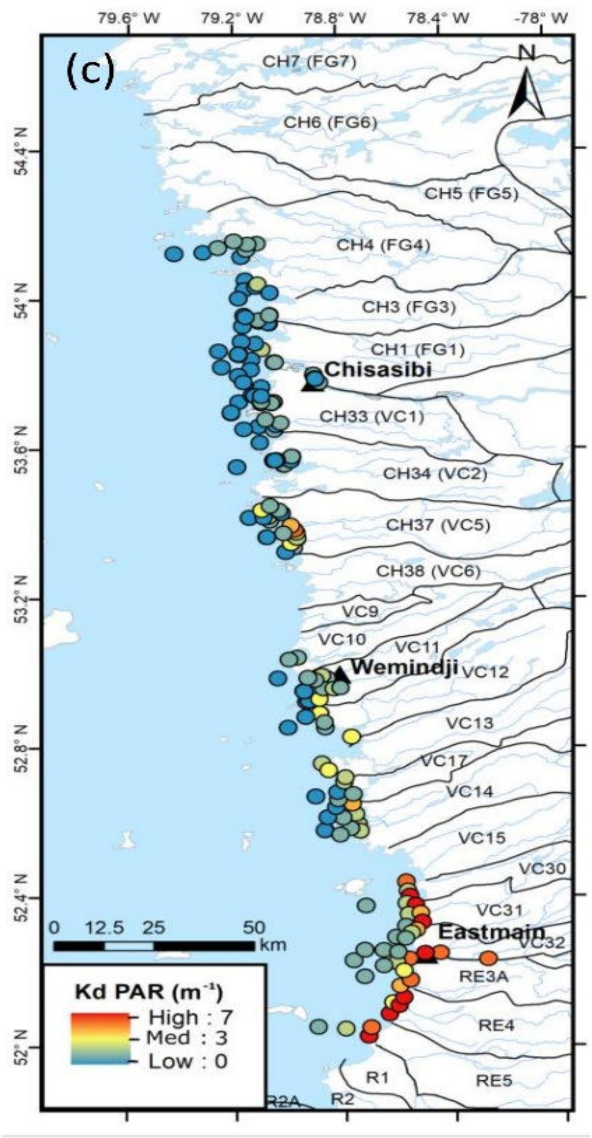
Suspended particle matter (SPM)

There is a general gradient in SPM concentration increasing from north to south. At a local scale, SPM is linked with river input, but also with sediment resuspension by waves and ice movement.



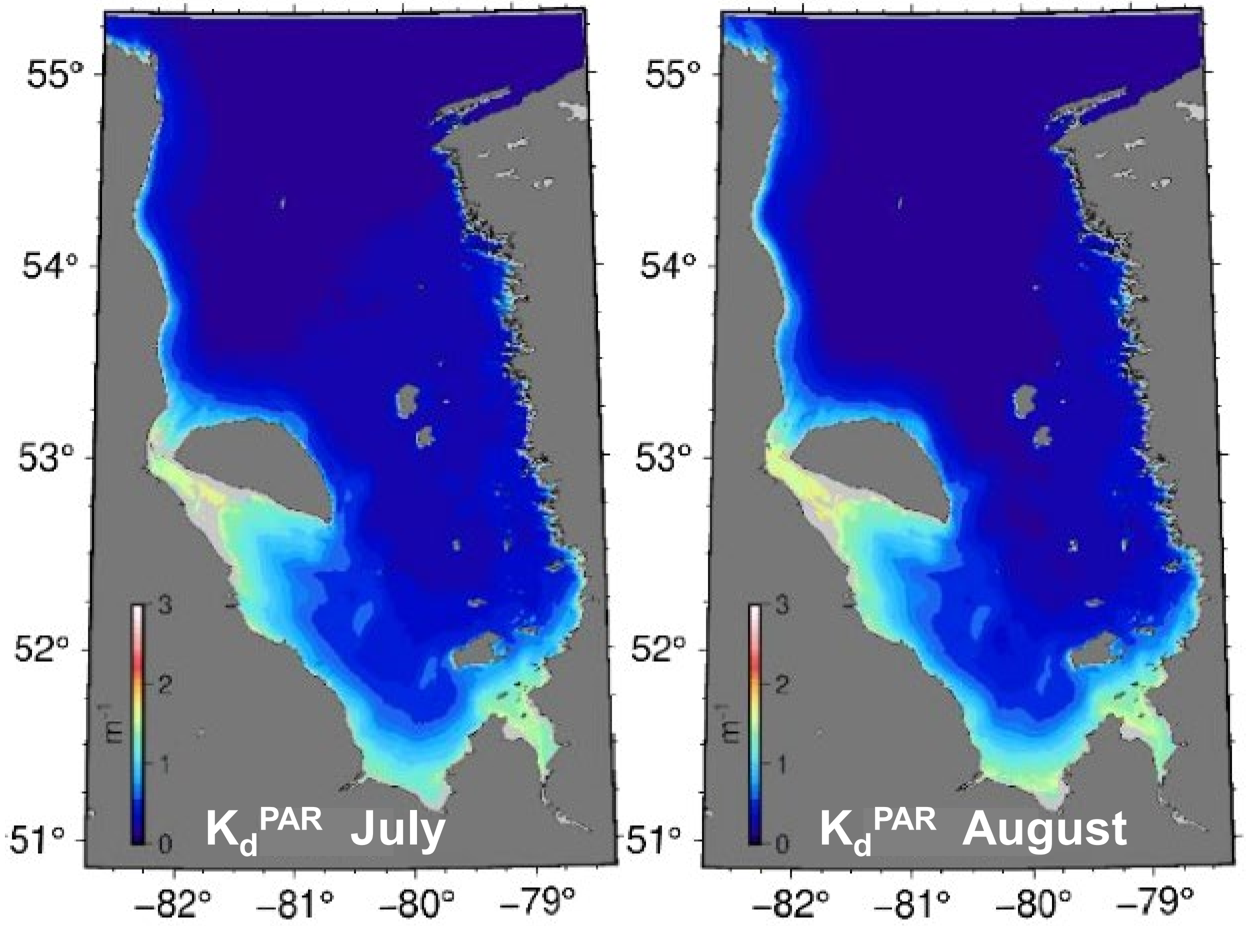


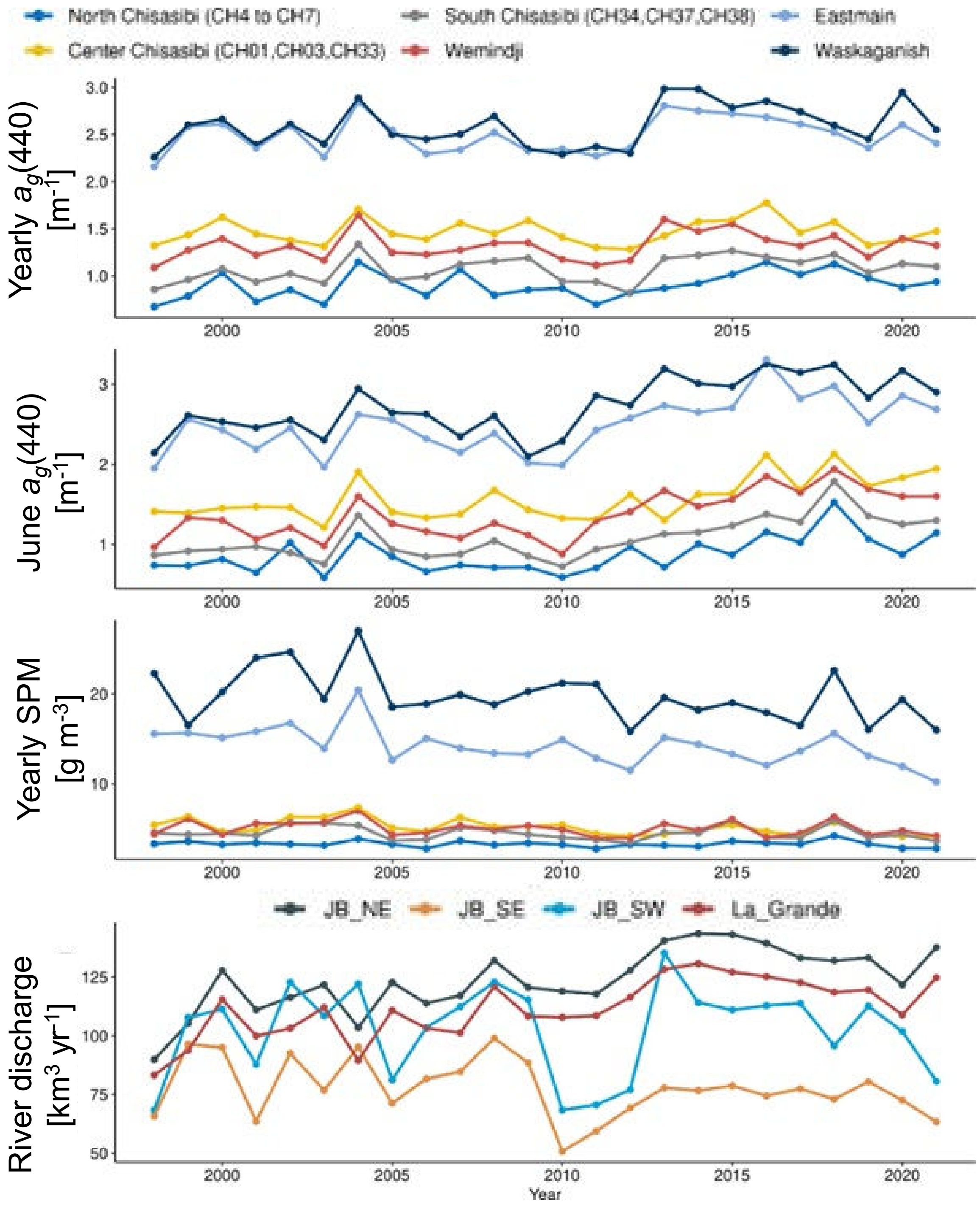
Light available for photosynthesis (K_d^{PAR})



The southeastern portion of James Bay has less light available for photosynthesis (higher K_d^{PAR} values),
except perhaps during some years with late ice breakup in the north.

K_d is positively correlated to CDOM and SPM.





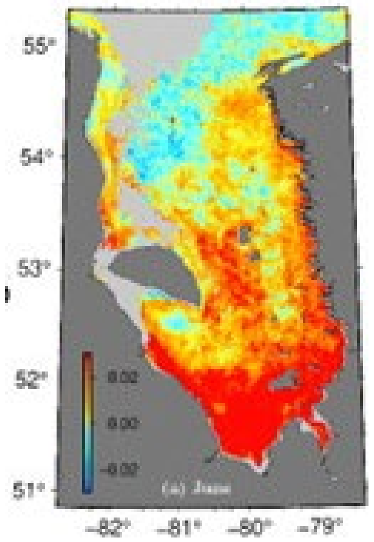
Evolution CDOM-SPM 1998-2021

CDOM concentration on a regional scale (from the coast to ~10 km offshore) is linked to natural river discharge – years of higher flow are related to years of more colorful coastal waters.

On the other hand, SPM concentration on a regional scale is not linked with discharge, indicating that other drivers are controlling SPM, such as resuspension by waves and ice displacement.

CDOM concentration in June has been increasing over the years, particularly since 2010.

CDOM in June
Rate of change
2003-2020



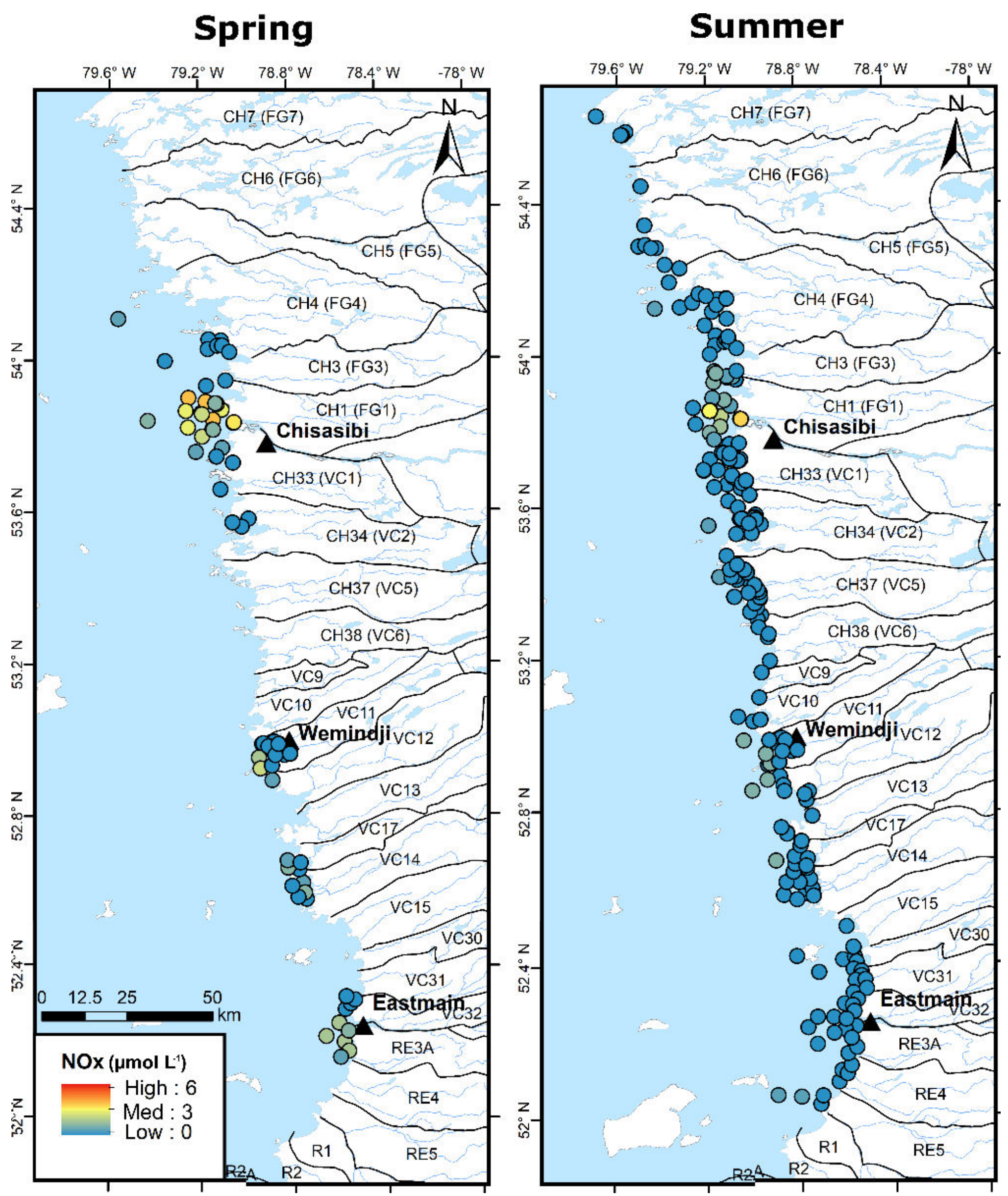
Nutrients and chlorophyll (Chl *a*)

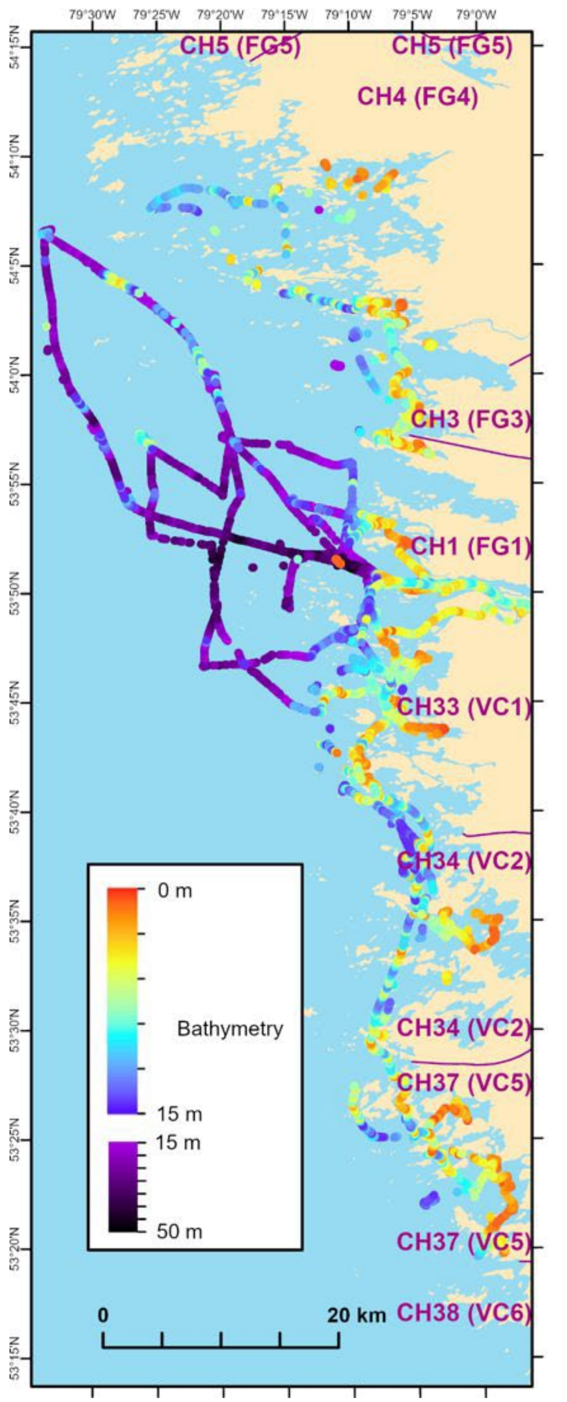
Nutrient concentration (nitrate+nitrite, silicate, and phosphate):

- Highest in winter;
- Decrease in spring with lowest in summer;
- The La Grande River is an important nutrient source in spring and summer.

Chl *a* concentrations are tightly coupled to nutrient dynamics and light availability:

- Lowest in winter (ice and snow cover);
- Highest in spring and summer;
- Decrease in fall (less light and depleted nutrients).



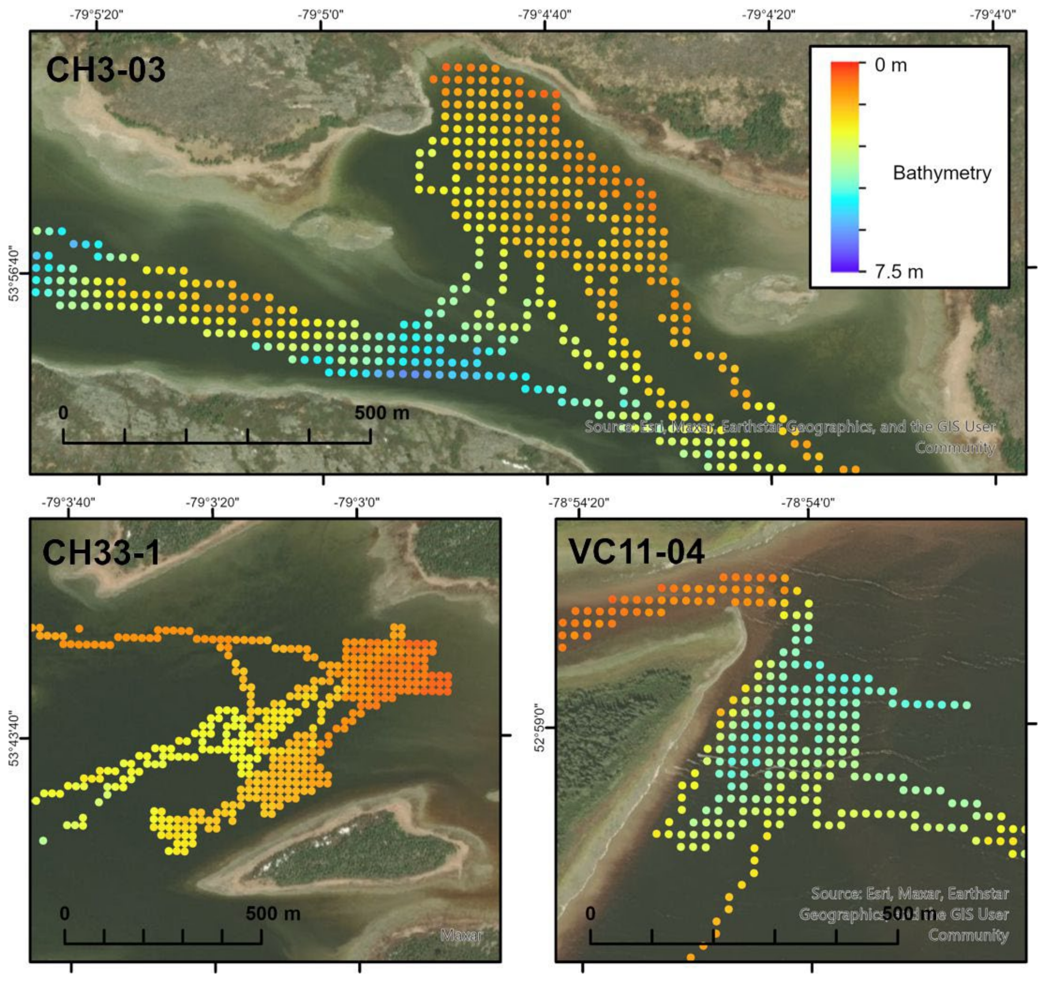


Water depth

The littoral area around Eastmain is very shallow with water depth of less than 5 m up to 3 km from the shoreline.

The bathymetry shows much more greater depth variations on short distance northward from Vieux-Comptoir River (VC14), with depth variations of 10-30 m on a horizontal distance of 100 m or less.

The surveyed eelgrass beds were on flat or gently sloping ground.



Examples of bathymetry results for three eelgrass beds (20×20 m grid)

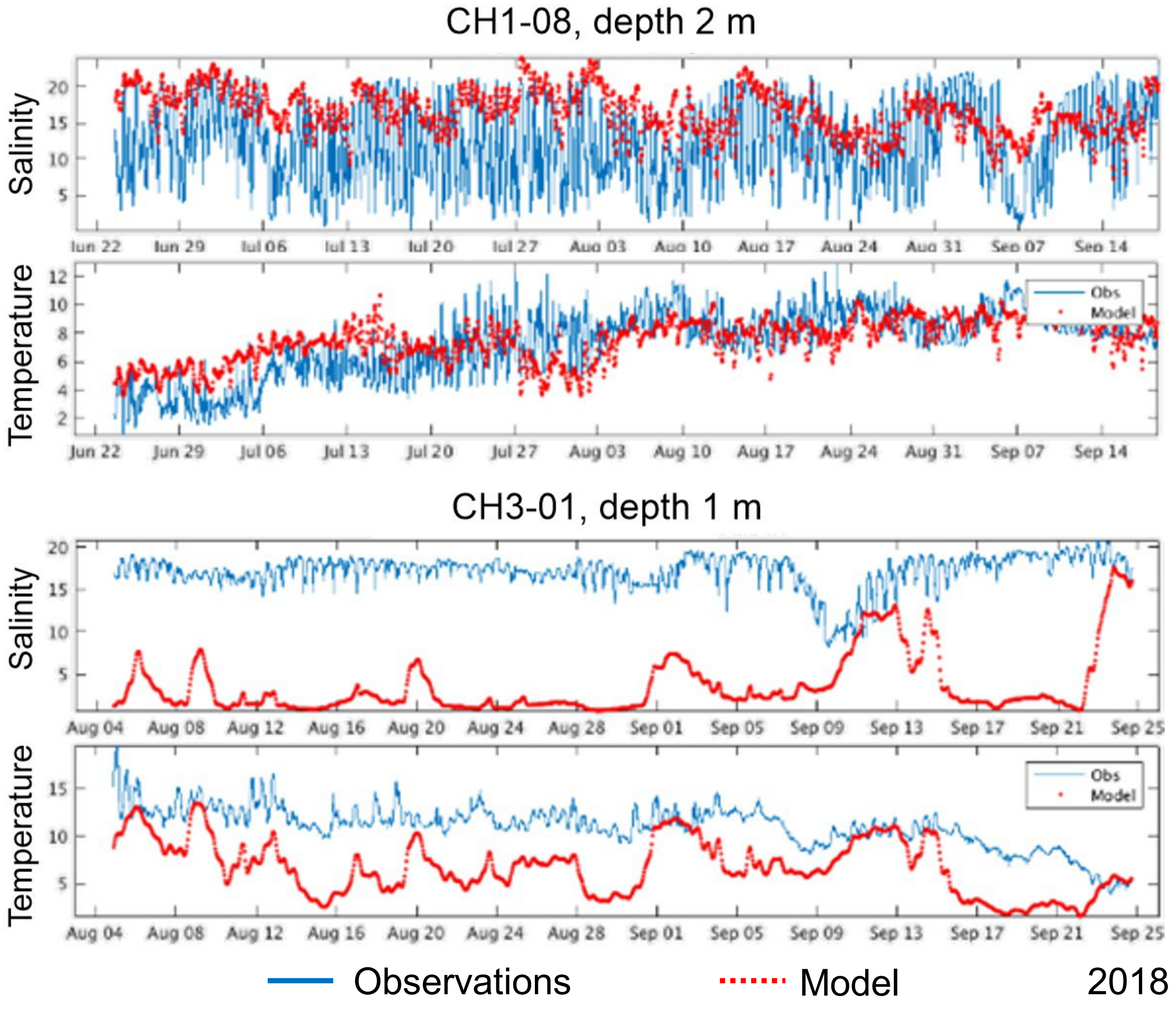
Salinity and current modelling

Currents, salinity, temperature, and sea ice was modeled for the James Bay on a 2×2 km grid.

The modeled water levels compare relatively well with tide gauge observations.

Observed salinity and temperatures are not well represented by the model, especially for surface waters.

The discrepancies are likely due to poor description of the coastal bathymetry and limited resolution of the model.

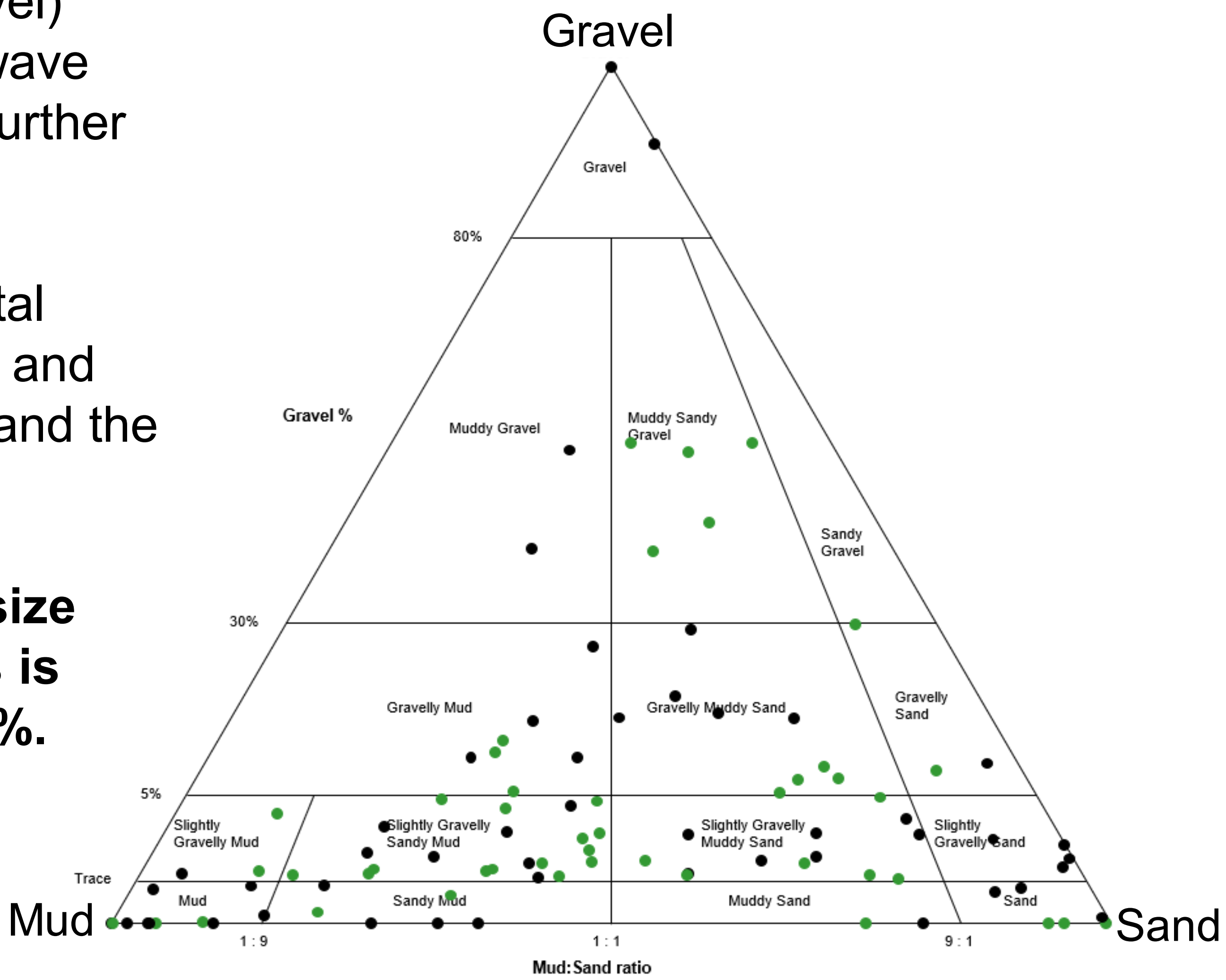


Grain size

Sediments are generally coarse (sand and gravel) near river mouths and along the coast, where wave action is important. The sediments are muddy further offshore and in low-energy coastal areas.

Grain size can vary over short distance in coastal areas due to the presence of numerous islands and the highly variable bathymetry of the Chisasibi and the Wemindji sectors.

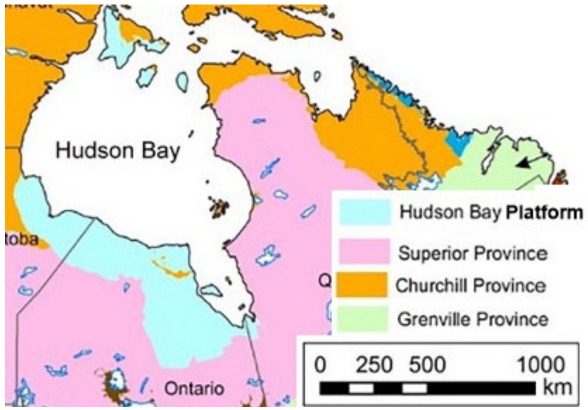
We observed no correlation between grain-size and eelgrass presence, except that eelgrass is absent when the gravel fraction is above 50%.

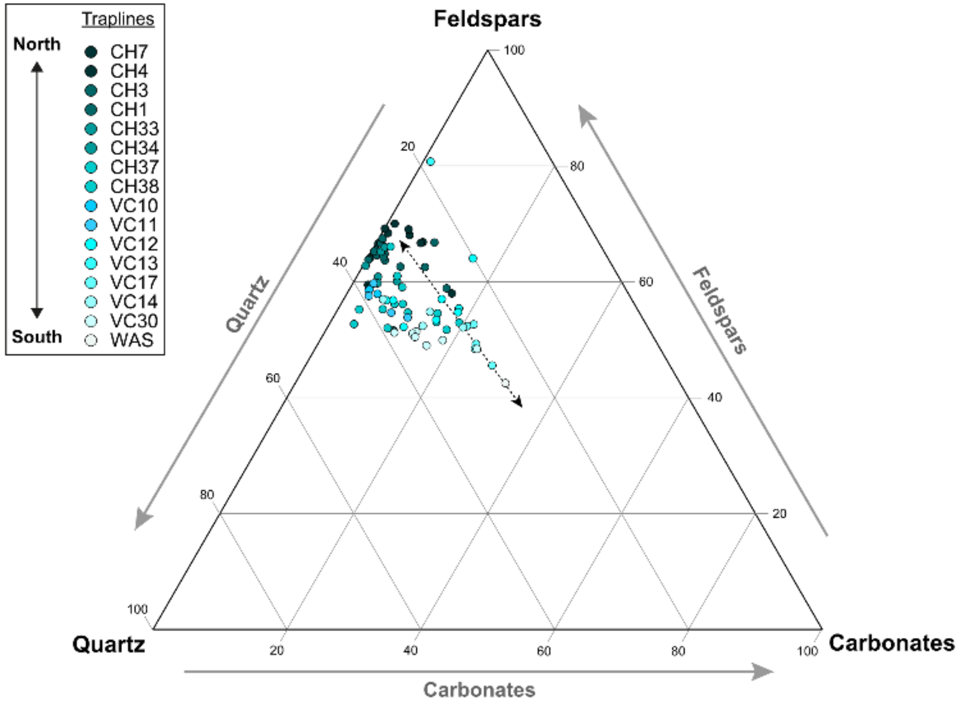


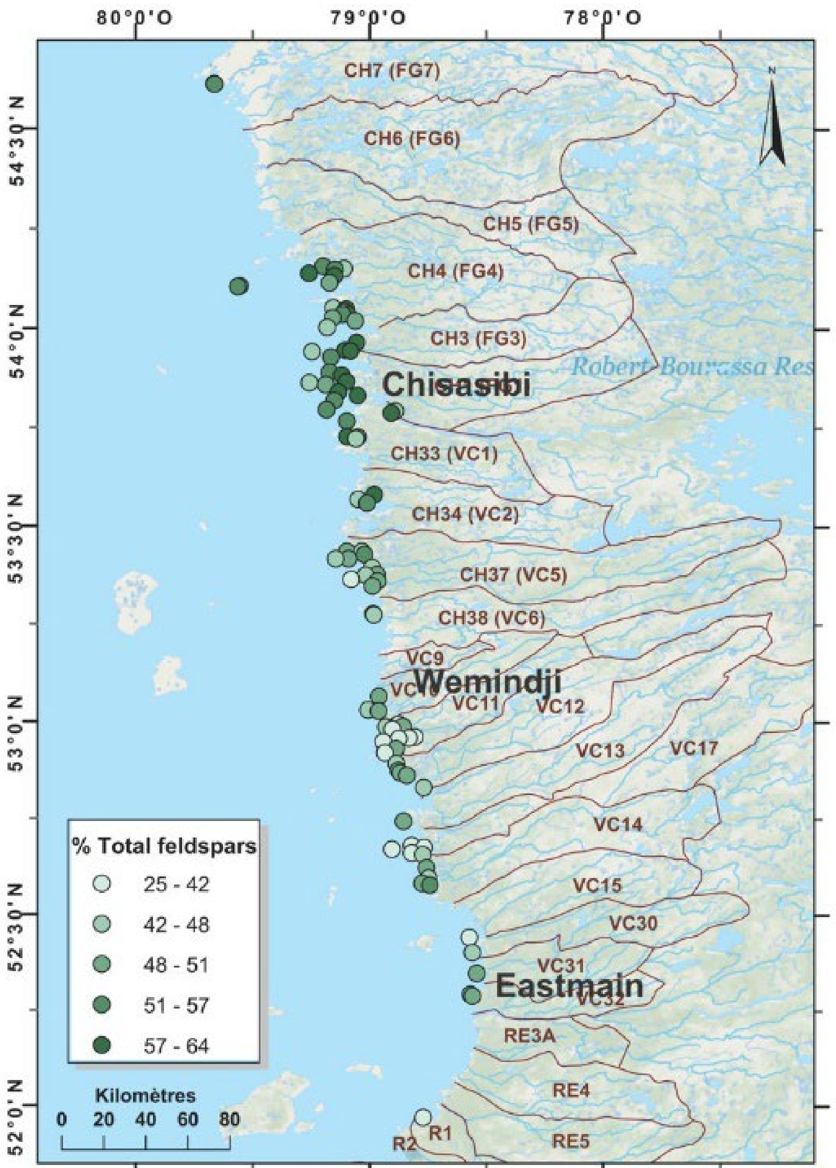
Mineralogical composition of surface sediments

The mineralogical composition of the sediments reveals a clear north-south pattern:

- Northeastern JB is rich in feldspars and K-Fe-Si-Ti elements, resulting from gneiss and granite erosion of the Superior Province.
- Southeastern JB is enriched in carbonates (dolomite and calcite), which come from the Hudson Bay Platform located further West.



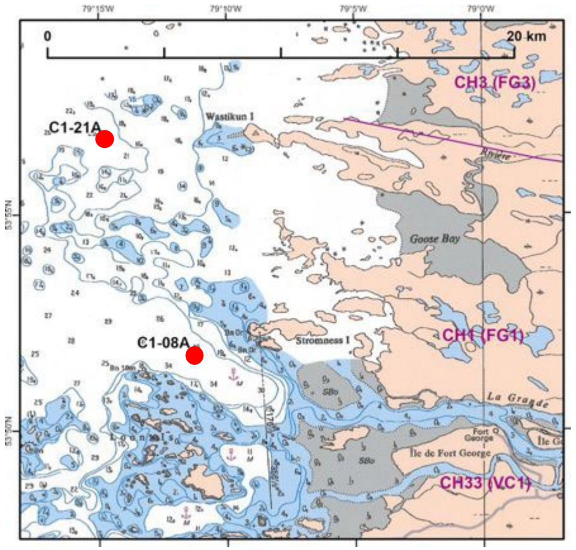




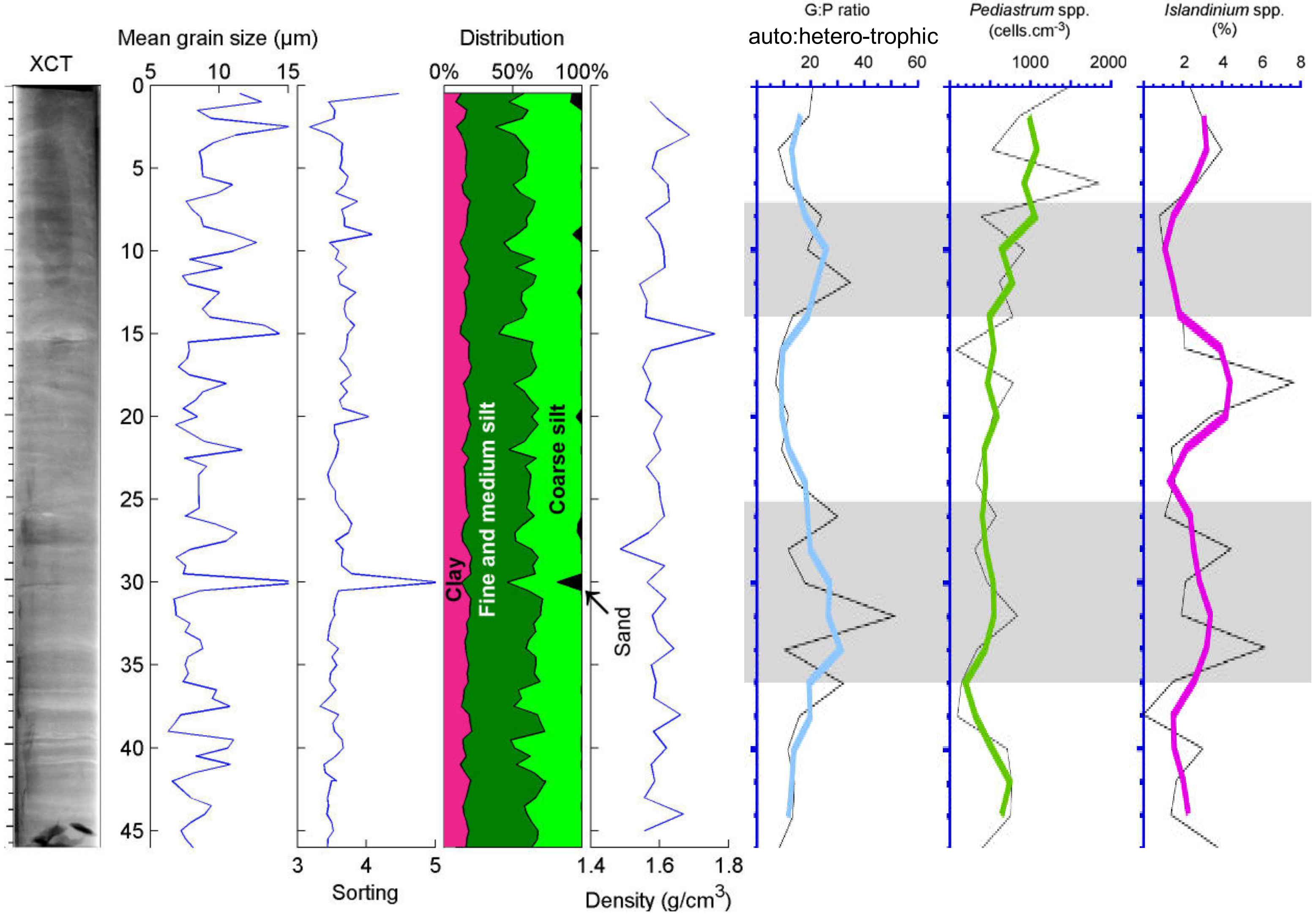
Sediment cores

Palynology analyses of two sediment cores taken near the mouth of the La Grande River suggest an increased influence of freshwater pulses in the last decades.

The sediment cores also showed a slight upward coarsening trend that probably reflects the increase in storm activity due to the shorter seasonal sea-ice cover in the last decades.



Core CH1-08 (in front of the La Grande River)



Conclusions (Main findings)

- Optically active constituents (mainly CDOM and SPM) show a distinct south-north trend, with southeastern James Bay having higher concentrations and generally less light available for photosynthesis.

- The derivations of the Eastmain, Caniapiscau and Rupert rivers increased the freshwater discharge of the La Grande River, especially in winter. Consequently, the La Grande plume increased in size compared to 1976, extending now from Dead Duck Bay to Bay of Many Islands in winter (isohaline 5 psu).

- The freshwater discharge to the eastern James Bay has increased from 1981 to 2023 by 15 % due to an increase in net precipitations on the watersheds. This increase resulted in more "colored" water (more terrigenous or riverine CDOM).

Possible future steps

This project has well described the seasonal and large-scale spatial variability of water properties. However, it would be useful:

- To explore further the short-term variations in water properties, waves, and currents at key locations throughout the productive season, including ice breakup and late fall;

- To perform detailed bathymetry surveys and sediment sampling in and around the eelgrass beds, which extent has been mapped, so that depth and sediment constraints for eelgrass growth could be defined;

- To survey on a large scale the coastal bathymetry of the eastern James Bay, in order to allow modelling of currents, extent of river plume, and waves.

Question time

?

Regions with similar water characteristics

In summer, eastern JB can be divided in four regions:

1. High CDOM, high SPM (around Eastmain)
2. Lower CDOM, lower SPM, high salinity
3. Low salinity, low CDOM, low SPM (around La Grande)
4. Lower nutrients, low CDOM, low SPM

In winter, region 1 extend further north (and has lower CDOM and lower SPM), and regions 3 extend further south and north.