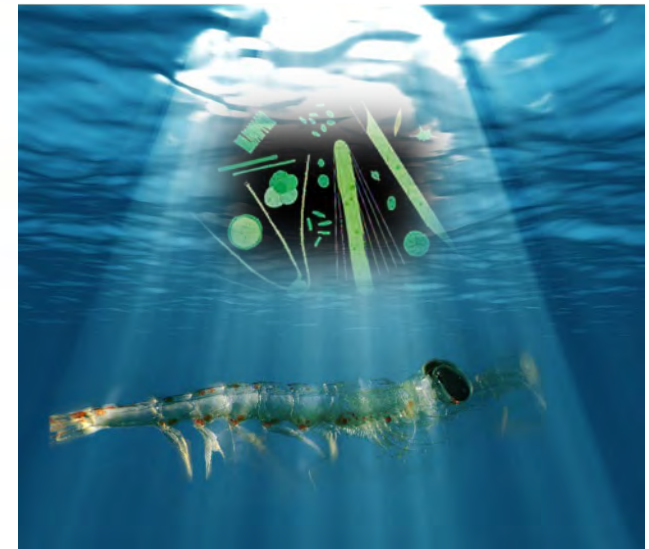
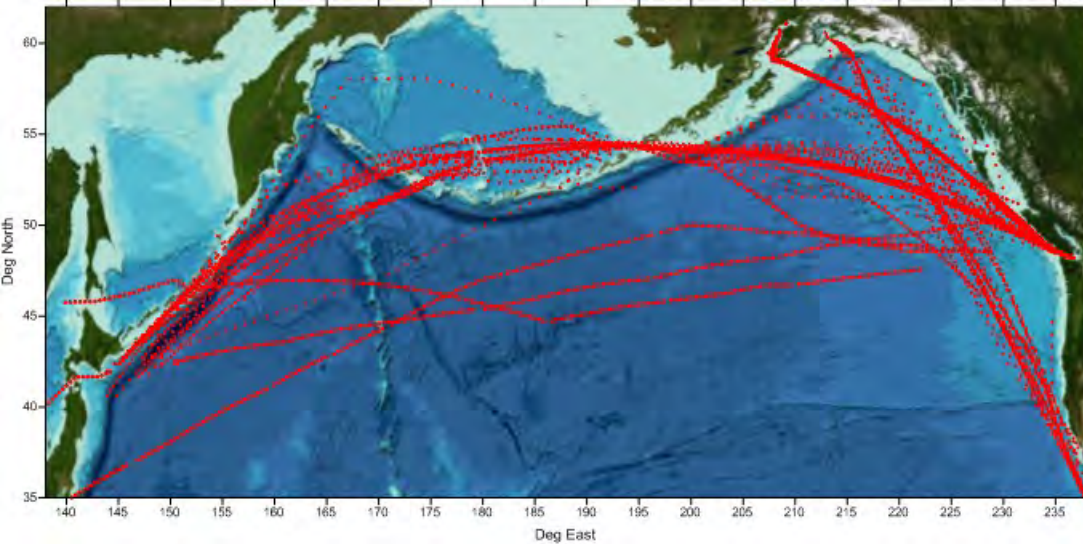


Data from the North Pacific Continuous Plankton Recorder Survey

Sonia Batten

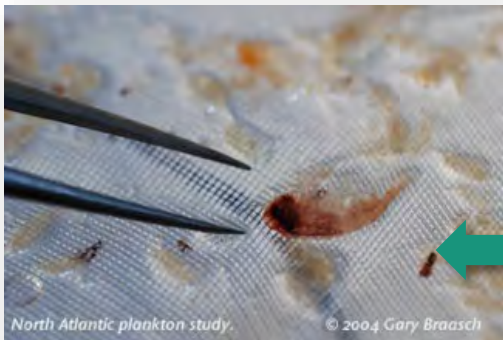
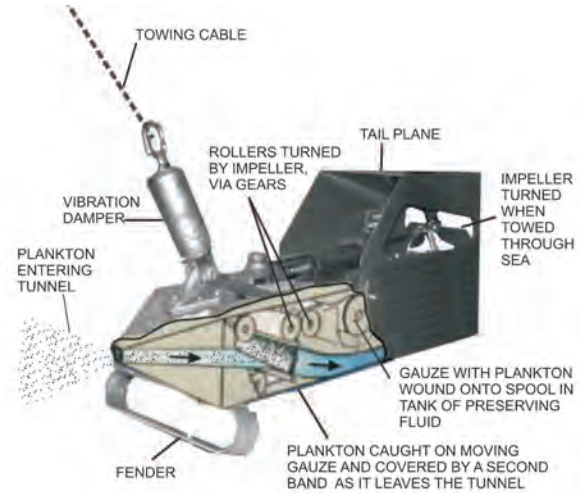
Sonia.batten@mba.ac.uk



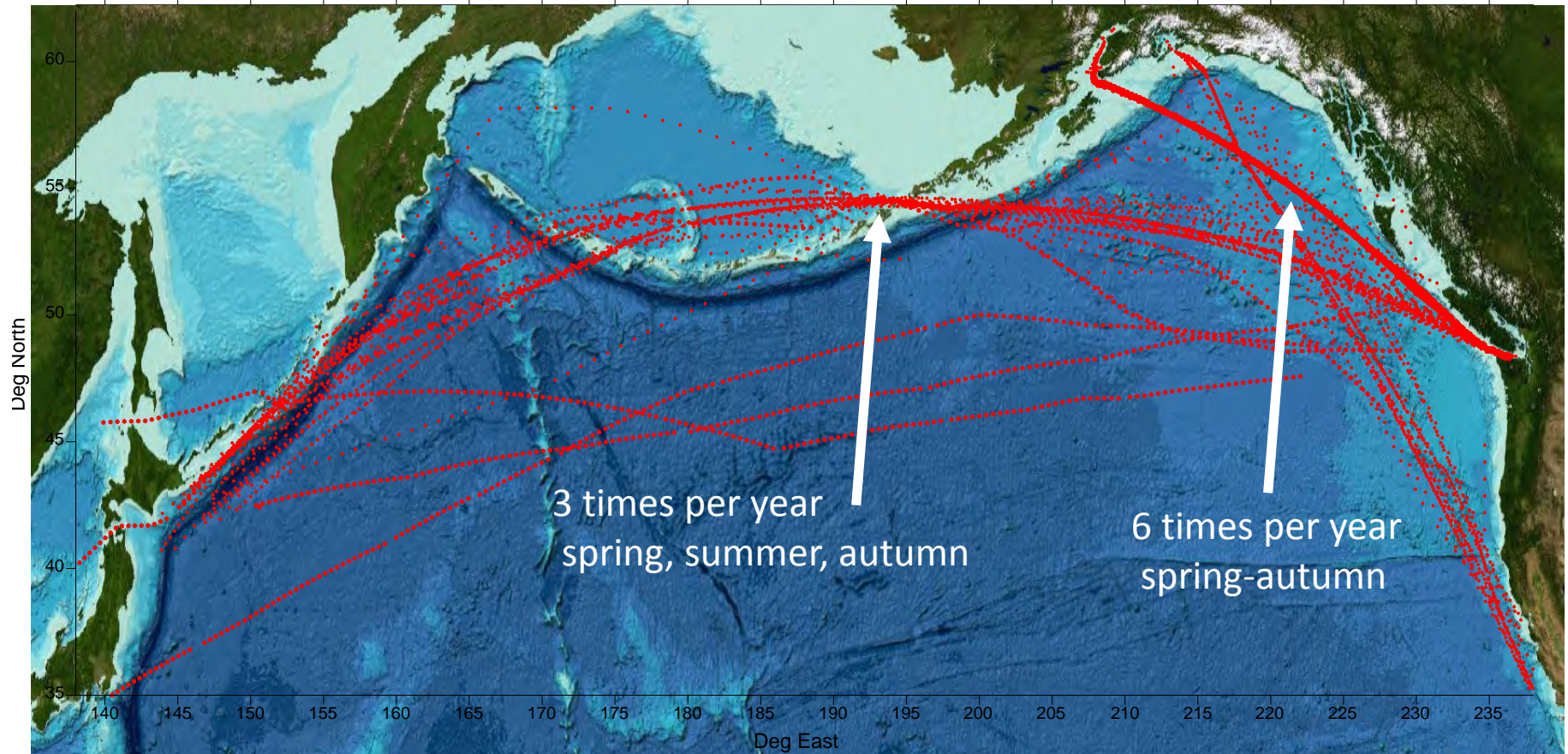
Structure of the presentation

- What is the CPR survey?
- What data does it collect?
- How are the data currently used?
- Role of PICES

Basic CPR survey operation



Pacific CPR survey

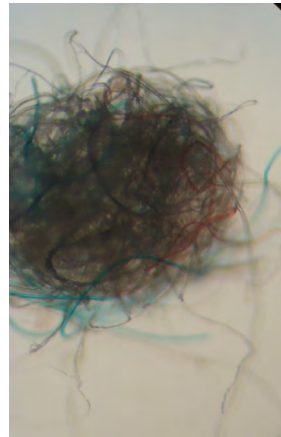
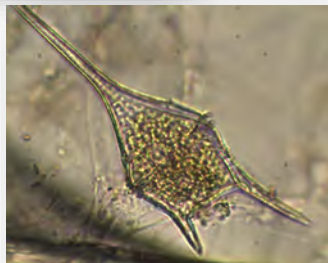
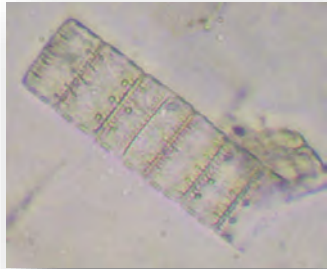


Began in 2000, now nearly two decades of data
>7,200 processed samples (>25,000 archived)

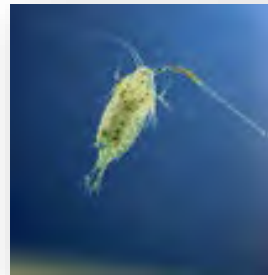
The Data.....

440+ “taxa”, and rising

phytoplankton



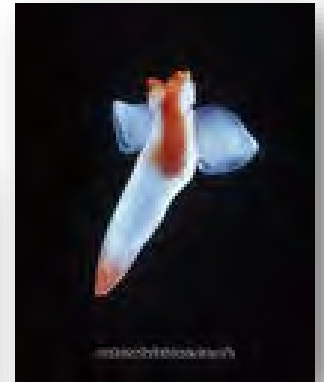
Micro plastics



microplankton



zooplankton



The Data.....

Sample data

Location, time, date, “night v day”

Processed or just archived?

Biological data

Taxonomic resolution varies (phylum to stage)

Raw counts and derived “products”

Quantitativeness varies, and is largely undefined

Physical data

Attached instrumentation can record T, S , D and Chl-a

Raw data and “per sample” means

Future additions?

1. Augmenting the CPR; the body as an instrumentation platform

In addition to the traditional biological sampling undertaken by the CPR the towed body can be equipped with a range of sensing capabilities to extend its utility for integrated observing.

SAHFOS Planktag : Conductivity, Temperature, Chlorophyll- α , Fluorescence and ambient Light. Data telemetry enables observations to be streamed back to SAHFOS within minutes of the CPR surfacing

SAHFOS WaMS : Water and Molecular Sampler

Vemco Minilog :
Temperature sensor

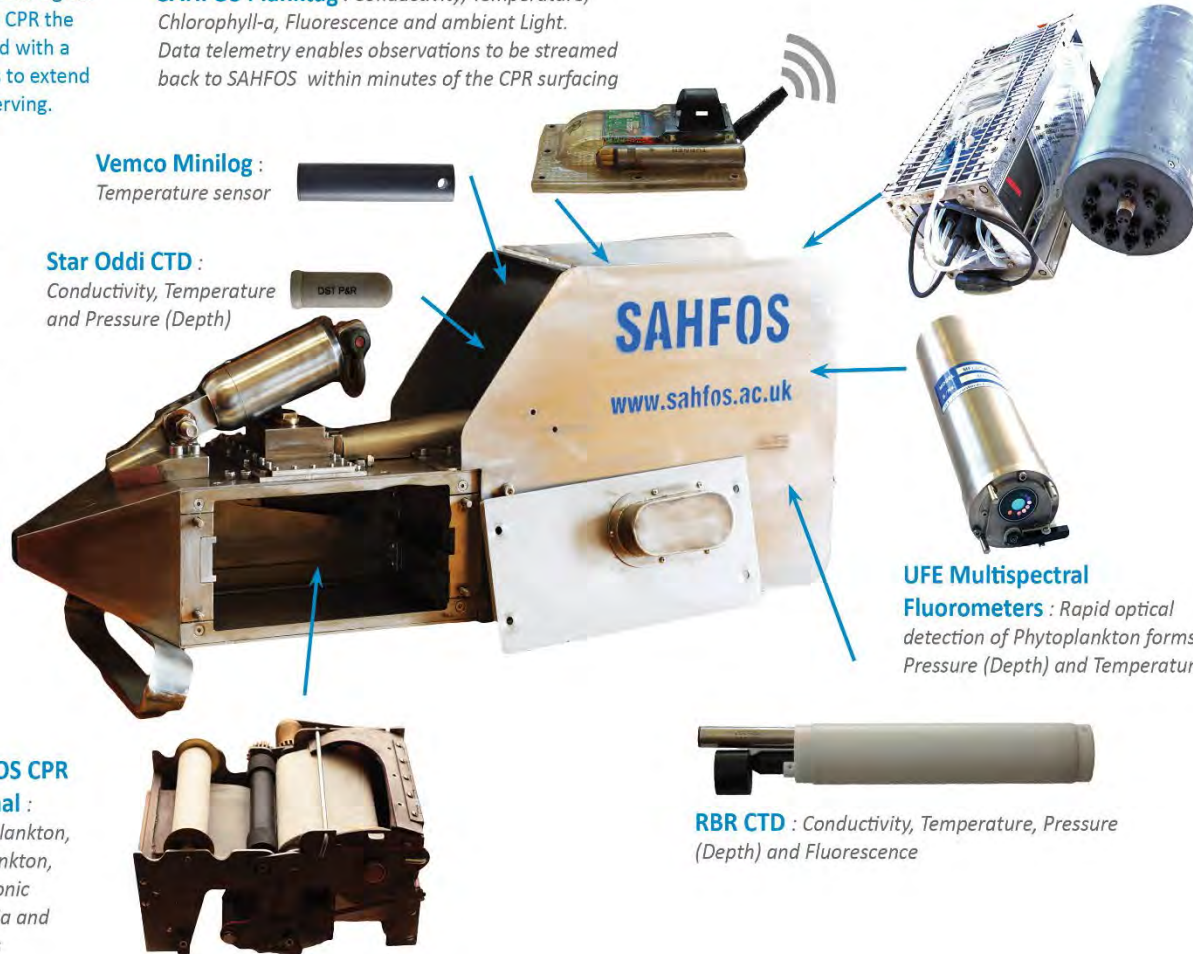
Star Oddi CTD :
Conductivity, Temperature and Pressure (Depth)

UFE Multispectral Fluorometers : Rapid optical detection of Phytoplankton forms, Pressure (Depth) and Temperature

RBR CTD : Conductivity, Temperature, Pressure (Depth) and Fluorescence

SAHFOS CPR Internal :
Phytoplankton, Zooplankton, Planktonic Bacteria and Viruses

Seawater enters via the aperture. Plankton is captured on a filter silk band then covered by a further silk band. The continuously moving band is wound through the CPR on rollers turned by gears, which are powered by a propeller allowing for long distances to be towed



Key Statistics

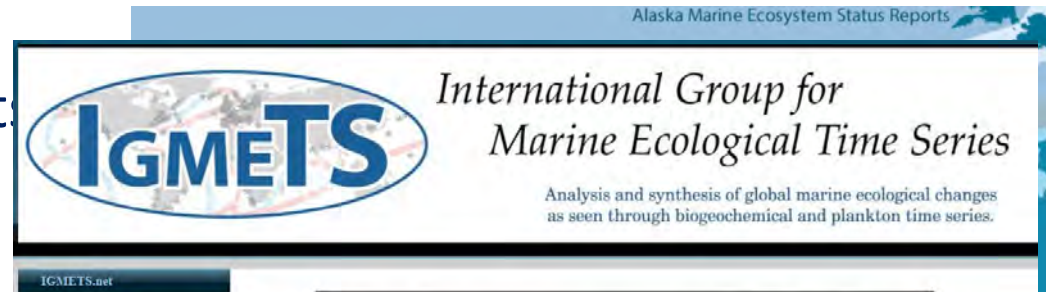
Length x width x height :
100 x 36 x 42 cm
Weight : 85kg
Tow depth : 5 - 10 metres
Tow speed : 8 - 25 knots
Aperture size : 1.27 cm²

Collects: Phyto- and Zooplankton, planktonic bacteria and viruses.

Instruments record:
Conductivity, Temperature, Depth, Chlorophyll- α , Fluorescence, ambient Light, and three-axis accelerations.

How are the data used?

1. Shared as raw data, to individual scientists on request
 - 25 primary papers, many “grey” pubs.
2. Analyzed for reports to funders and for proposals
3. To produce metrics and derived products within:
 - NOAA Ecosystem Considerations Report
 - IGMETS
 - PICES NPESR 1-3



...scientists have to characterize and
...long, temporally resolved datasets
...stationary biogeochemical time-series
...and generally cannot be extrapolated
...reliability can be examined via large

Where are the data?

Entire raw dataset:

At the Marine Biological Association (CPR Survey home)

My computer!



Partial dataset:

With funding agencies (EVOS/NPRB/DFO)

PICES

OBIS



*Exxon Valdez
Oil Spill
Trustee
Council*



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Derived products:

IGMETS

NOAA Ecosystem Considerations Reports

PICES - NPESR



Role of PICES

Currently, PICES website contains:

- Background info

• CTD

• Plan

1.

2.



The screenshot shows the PICES website interface. At the top, there is a header with the PICES logo (a globe) and the text "North Pacific Marine Science Organization". Below the header is a navigation menu with links for Home, About, Members, News, Projects, Publications, and Meetings. A search bar is located on the left side of the page. The main content area displays the title "The Continuous Plankton Recorder Survey of the North Pacific" and a "Background" section. The background section contains text about the Continuous Plankton Recorder (CPR) and its history, including its deployment in 1997 and its role in monitoring the north Pacific. The text mentions the Sir Alister Hardy Foundation for Ocean Science (SAHFOS), the North Pacific Marine Science Organisation (PICES), and the North Pacific Research Board (NPRB). It also describes the CPR's function and the data it collects, as well as the funding and support for the program.

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WWW PICES

[Other Projects](#)

CPR

- [Current Status](#)
- [Background](#)
- [Time Series Data](#)
- [Methods](#)
- [Publications](#)

The Continuous Plankton Recorder Survey of the North Pacific

Background

The Continuous Plankton Recorder (**CPR**) was first deployed in the north Pacific in summer 1997 as a feasibility study carried out by the Sir Alister Hardy Foundation for Ocean Science (**SAHFOS**). CPRs had been deployed for over 70 years in the north Atlantic from Ships-of-Opportunity, currently managed by SAHFOS, providing a wealth of time series data (Reid et al., 2003). In contrast, the open ocean areas of the north Pacific have been historically poorly sampled. Presentations were made at the 1998 annual North Pacific Marine Science Organisation (**PICES**) meeting and from this followed a recommendation that the CPR be used to address the lack of open ocean plankton data. The cost-effectiveness of ship-of-opportunity sampling, the tried-and-tested nature of the CPR and the growing recognition that zooplankton respond rapidly to climate change and also provide the link between changes in the atmosphere and important upper trophic level populations all provided the impetus for support for CPR sampling.

The first proposal was funded by the North Pacific Marine Research program to collect plankton samples in 2000 and 2001 and a third year, supported by the North Pacific Research Board (**NPRB**), followed on from this. Funding was also obtained in 2002 from the Exxon Valdez Oil Spill Trustee Council (**EVOS**) for the transect in the Gulf of Alaska and since then the NPRB has supported the ~6,500km transect running east-west across the north Pacific and the EVOS TC has supported the ~2,500 km north-south Gulf of Alaska transect. From 2000 to 2003 the north-south transect ran from Prince William Sound to California but was modified in 2004, when that ship was withdrawn, to a new transect from 2004 between Cook Inlet and Puget Sound. This transect is now in its 4th year of sampling.

Sampling on the east-west transect was enhanced in 2002 through collaborations with the Point Reyes Bird Observatory Conservation Science (Dr Bill Sydeman) and the Canadian Wildlife Service (Dr Ken Morgan) to make simultaneous observations of marine bird and mammal distributions. In 2004 a CTD was fitted to the CPR to additionally sample the physical environment (temperature, salinity and chlorophyll a as fluorescence).

In 2003 collaborative agreements were set up with the Prince William Sound Science Centre in Valdez and Fisheries and Oceans, Canada (the Institute of Ocean Sciences in Sidney, BC) to service and unload the CPRs locally. Initial sample processing is now carried out at IOS and a subset of samples are analysed within a few weeks of the ship's return so that some data can be available quickly, to give an idea of current conditions. Full, quality controlled data are available within a year of collection. Although long term funding has not been secured the program is now in its 8th year of sampling and many studies have resulted from the data (see below). The program is overseen by the PICES CPR Advisory Panel and interest and enthusiasm to continue and extend the program is ongoing. The initial support from PICES and the NPMR program has therefore firmly set the foundations of a large scale monitoring program for the north Pacific.

Role of PICES

Currently, PICES website contains:

- Background info
- CTD data, by transect

1. Pla

2.

North Pacific Marine Science Organization

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Search Site GO

WWW PICES

[Other Projects](#)

CPR

- [Current Status](#)
- [Background](#)
- [Time Series Data](#)
- [Methods](#)
- [Publications](#)

The Continuous Plankton Recorder Survey of the North Pacific: CTD data

[Sample collection and processing: Methods](#)

CTD Data

A variety of instruments have been attached to the CPR to record physical variables (Table 1). Simple temperature loggers have been most commonly used and 3 CTDs have been trialled. The most recent, the Brancker XR620, has proven to be the most reliable, returning 100% of the data in 2 full deployments along the east-west transect (previous Chelsea Instrument's CTDs suffered from vibrations occurring during the tow and often stopped recording). Figure 1 shows the CTD fitted under the tail section of the CPR and Figure 2 some of the data.

In all cases position of each data record is calculated from the ship's log and the internal clock of the instrument. Such instruments can be fitted to each CPR, it is only financial constraints that limit their deployment. The Brancker will remain on the east-west CPR during its 2008 deployments.

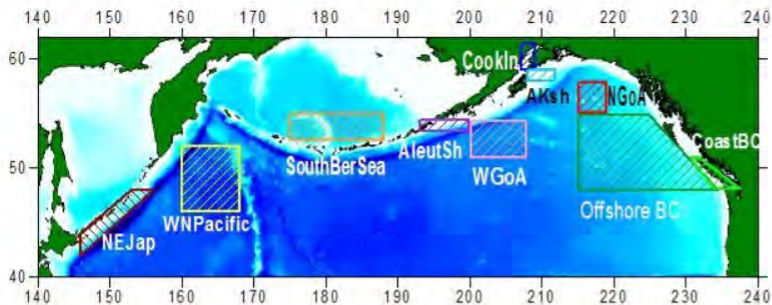
Table 1. Catalogue of physical data collected

Transect	Dates	Temperature	Salinity	Depth	Chl-a	Notes
N-S	2017, Oct	✓				Vemco temp. logger
N-S	2017, Sept-Oct	✓				Vemco temp. logger
N-S	2017, Aug-Sept	✓				Vemco temp. logger
N-S	2017, July	✓				Vemco temp. logger
N-S	2017, May	✓				Vemco temp. logger
N-S	2017, Apr	✓				Vemco temp. logger
E-W	2017, Aug	✓	✓	✓	✓	Brancker XR620
E-W	2017, May	✓	✓	✓	✓	Brancker XR620
N-S	2016, Sept	✓				Vemco temp. logger
N-S	2016, Aug	✓				Vemco temp. logger

Role of PICES

Currently, PICES website contains:

- Background info
- CTD data, by transect
- Plankton data for regions
 1. By user-defined taxon



Choose the region you are interested in:

Region: 364 samples found for this region

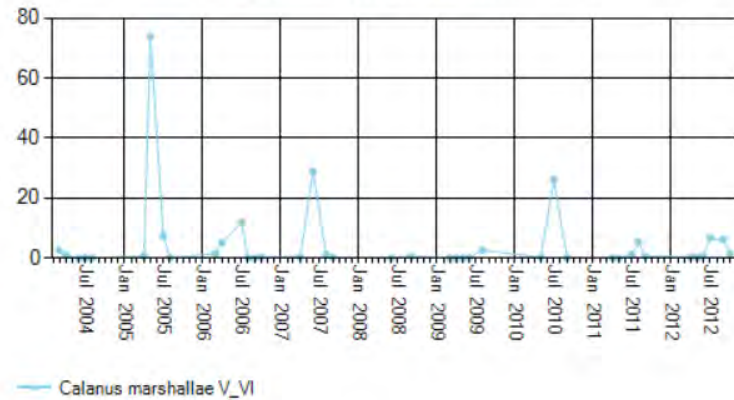
Zooplankton

Phytoplankton

Occurrences	Zooplankton Species	Graph
221	Para-pseudocalanus spp.	<input type="checkbox"/>
140	Neocalanus plumchrus/flemingeri V (>4.2 mm)	<input type="checkbox"/>
138	Pseudocalanus sp. adult	<input type="checkbox"/>
125	Calanus marshallae V_VI	<input checked="" type="checkbox"/>
124	Hyperiid	<input type="checkbox"/>
117	Calanus pacificus V_VI	<input type="checkbox"/>
115	Acartia longiremis	<input type="checkbox"/>
114	Neocalanus plumchrus/flemingeri IV	<input type="checkbox"/>
81	Euphausiacea Total	<input type="checkbox"/>
80	Neocalanus plumchrus/flemingeri V (3.4-3.9mm) from 2001 only	<input type="checkbox"/>

Zooplankton

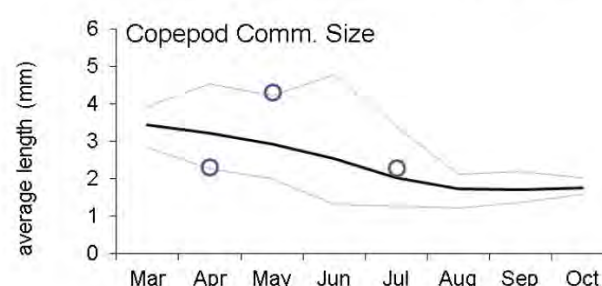
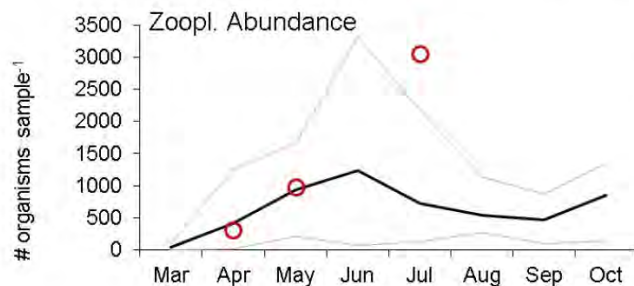
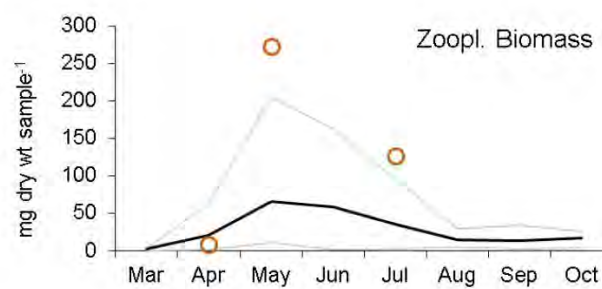
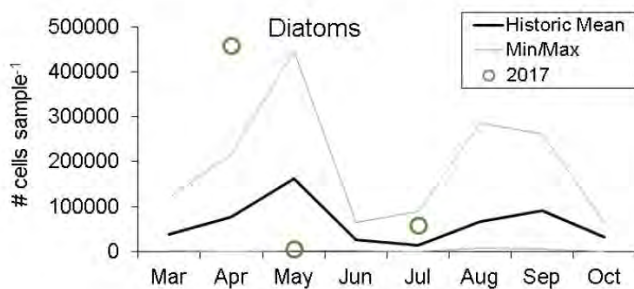
Zooplankton Species Abundance



Role of PICES

Currently, PICES website contains:

- Background info
- CTD data, by transect
- Plankton data for regions
 1. By user-defined taxon
 2. Latest update



- Current year compared to historical values
- Selected regions
- Not QC'd data (numbers may change)

Role of PICES

Primary goal has been to make the data/project discoverable by pointing to potential products, publications, source for further data

We COULD make all raw data downloadable:

Advantages	Disadvantages
Less time later on creating products	CPR data are complex and could be misinterpreted
Simpler updates	More time initially setting up metadata and useful information
More obviously “open access”	May miss opportunities to collaborate
	May miss research that could be used to gain more funding

Other considerations

- Need to know from the PICES community what would be most useful before we modify/update existing output
- Mechanism for feedback needed
- What products needed for models, managers, stakeholders etc?
 - Is this a role of T-CODE? Or is discoverability enough?
- Balancing this against highly limited resources within PICES and the N Pacific CPR Survey!

Thank you!

To:
The funding
organizations



**Exxon Valdez
Oil Spill
Trustee
Council**



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Volunteer ships that
collect the samples



CPR Survey personnel
who create the data



PICES secretariat
(especially Julia!)

